Provisional Agenda Item 3 **CCGE(98)1**

THE SUSTAINABLE MANAGEMENT AND USE OF FRESHWATER RESOURCES: STRATEGIC ISSUES AND AN AGENDA FOR ACTION

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*Prepared by the Commonwealth Secretariat with assistance from Environmental Resources Management (UK)

EXECUTIVE SUMMARY

Despite progress in improving some aspects of freshwater management since 1992, there remains a substantial "unfinished agenda" to be addressed by the intergovernmental process on freshwater to be launched by the Commission on Sustainable Development (CSD).

I. STRATEGIC ISSUES

ii. The key issues affecting freshwater use and management are:

- ***Water scarcity*** - Water shortages are causing widespread public health problems, limiting development and damaging ecosystems. Unless there are significant changes in policies, this situation is predicted to get progressively worse, with possibly up to 1 billion people living in water-stressed countries by 2025. By 2050, 15 Commonwealth countries may be chronically water-stressed.

- ***Competition among users*** - Domestic and industrial effluents and agricultural practices have left many rivers and aquifers heavily contaminated and watersheds seriously degraded. There is intense competition between different users for water of sufficient quality. Its allocation is often inefficient, unsustainable and inequitable and does not take account of the full economic, social and environmental costs. Most seriously, the basic needs of vast numbers of the urban and rural poor continue to be neglected.

- ***Institutional weaknesses*** - Water institutions in many countries remain relatively weak, without the resources or policy instruments to implement effective control over the management of water resources. They also lack the necessary information and technical know-how. Policy decisions are often made without the participation of those involved in the practical management of water resources and other stakeholders. The role and contribution of women continues to be undervalued.

- ***Water pricing*** - Water continues to be a grossly undervalued resource. In many countries it is a free good, and in almost none is the full cost of its use charged. Water use is therefore often subsidised, but subsidies are rarely targeted on those who need them the most. The burden of current pricing structures is often borne inequitably, and there are few incentives to minimise consumption and pollution.

- ***Financing*** - External aid resources are under pressure and governments can no longer meet the full costs of infrastructure and service provision. There is an urgent need to strengthen international

assistance, and mobilise new investment from both public and private sources.

- ***International co-operation*** - where there is insufficient dialogue and consultation among riparian states, over-exploitation of transboundary water resources, including groundwater, in certain regions is increasingly likely, increasing the potential for conflict.

II. AN AGENDA FOR ACTION

iii. Action will be needed at several levels in order to promote the sustainable management and use of freshwater. A possible agenda is set out below.

- ***Policy framework*** - Water should be recognised as both a social and an economic good, vital for meeting basic human needs, food security, poverty alleviation and the protection of vital ecosystems. Policies for water management should be based on an integrated approach, taking into account the full range of ecological, economic and social factors and needs. Strategies should be based on the catchment as the unit of management, include demand management and conservation measures, aim to increase access to drinking water and sanitation, and to improve pollution prevention and control. Actions to meet commitments under relevant international conventions should be integrated within strategies for water management.

- ***Institutional strengthening*** - To ensure effective implementation of water strategies, institutional structures in many countries need to be strengthened and capacities enhanced. Effective legislative frameworks need to be put in place, along with the necessary mechanisms to improve regulation and enforcement. The policy development process must include measures to encourage stakeholder participation in an open and broad-based dialogue, with particular emphasis on the role of women, but including all stakeholders. Assistance with training and information management is needed, as is access to appropriate technology and shared experience and expertise.

- ***Financing*** - A high priority must continue to be given to enhancing official development assistance (ODA) and concessional lending for the water sector. This should be complemented by greater efforts to mobilise additional domestic resources, especially investment from the private sector. Governments increasingly need to change their traditional role from direct providers of water and sanitation infrastructure to that of creating an enabling environment for more effective and efficient investments. The potential for forming

public/private partnerships to increase investment in water infrastructure and services could be explored more vigorously.

- ***Water pricing*** - Pricing policies should aim to take account of the full costs (economic, environmental and social) of water management and use, encourage efficiency and minimise pollution. Greater use of well designed market-based economic instruments would help to achieve more realistic pricing policies based on the polluter pays and user pays principles. Any subsidies should reflect social needs and ability to pay, ensuring that the basic needs of the poor are met.

- ***Improving co-operation among riparian states:*** A shared vision and greater co-operation in the management of international and transboundary watercourses, including groundwater, can help to maximise mutual benefits for riparian countries. Where it is appropriate to do so, co-operation among riparian states can be encouraged through international assistance.

- ***Intergovernmental dialogue on freshwater***: The dialogue to be initiated by the CSD would be most effective if it focused on ways of accelerating the implementation of existing intergovernmental commitments and agreements on freshwater, with agreement on the means of implementing these commitments (in terms of financing, technology transfer and capacity building). The dialogue could also focus on the measures needed to improve co-ordination of activities on freshwater within, and among, the major international organisations which are active in this area.

- ***Commonwealth co-operation:*** The Commonwealth's wide range of experience and expertise in different facets of water resources management can be harnessed to strengthen co-operation. The following areas could be explored: exchange of experience, information and expertise, as well as demonstration projects, in key areas (e.g. best practices in implementing measures to increase water-use efficiency in major sectors and to prevent and control pollution); technical assistance and training to develop human resources and institutional capacities for water resources management, with particular attention given to the special needs of small states; the creation of a Commonwealth-wide water information network linking water experts and institutions; and the promotion of public/private partnerships to increase investment in water infrastructure and services.

Introduction

Despite progress in improving some aspects of freshwater resources management since the 1992 Rio Earth Summit, it is widely acknowledged that overall progress has been neither sufficient nor comprehensive enough to reduce general trends of increasing water shortages, deteriorating water quality and mounting stress on freshwater ecosystems. There remains a substantial "unfinished agenda" to be addressed by the intergovernmental process on freshwater to be launched by the Commission on Sustainable Development (CSD). This paper, which is intended to assist the CCGE's discussions on item 3 of the Provisional Agenda, consists of two parts. Part I highlights some of the strategic issues pertinent to the sustainable management and use of freshwater. Based on the analysis of these issues, Part II sets out a possible agenda for action

I. STRATEGIC ISSUES

Water Scarcity

2. The Comprehensive Assessment of the Freshwater Resources of the World, submitted to the 1997 session of the CSD, concluded that water shortages are causing widespread public health problems, limiting development and damaging ecosystems. In 1990, 20 countries with a combined population of 132 million were classified as water-stressed (i.e. water availability per capita was at a level judged to be impeding development and jeopardising human health). This group included five Commonwealth countries, Barbados, Kenya, Malawi, Malta and Singapore. The number of water-stressed countries is predicted to increase to 45 by the year 2050, of which 24 are in Africa and 12 in the Middle East. These countries include 8 additional Commonwealth African countries (Ghana, Lesotho, Mozambique, South Africa, Tanzania, Uganda and Zimbabwe) as well as Cyprus.

3. The deteriorating quality of water is also an increasing problem but one which, relative to quantity, receives limited attention. Domestic and industrial effluents have left many urban rivers and groundwater sources heavily contaminated, causing widespread public health problems, limiting economic development and placing a heavy burden on vital ecosystems. Land use practices, particularly agriculture, are also having severe impacts on water quality in many countries. The net result is the progressive degradation of hydro-environments.

Drinking Water Supply and Sanitation

4. Despite the work done in the 1980s during the UN International Drinking Water Supply and Sanitation Decade, it is estimated that over 1 billion people (about a fifth of the world's population) do not have access to an adequate supply of safe water, and that up to half of the world's population does not have adequate sanitation. The result is widespread and frequent public health problems, causing millions of preventable deaths every year, particularly among children. The cycle of

poverty is perpetuated, preventing those affected from achieving their full potential as productive members of society. The opportunity cost is high, particularly for women, who often have the task of collecting water, cooking, cleaning and childcare, all of which are significantly affected by inadequate water supply and sanitation.

5. In countries with rapidly growing urban populations, water supply and sewerage networks are inadequate leaving large numbers of people in urban and peri-urban areas with no access to safe water or sanitation. The degradation of both surface and groundwater forces large cities to either import water at disproportionate and inequitable cost to the urban poor, or to expose the population to unsafe water. Leaking collection and distribution systems are a significant problem, wasting an estimated 30-60 per cent of water resources, losing income and causing major health hazards in urban areas. Lack of water and sanitation is also a problem in rural areas, with many water sources local to settlements becoming increasingly contaminated from waste heaps, adding to the pressures on people to migrate to urban areas.

6. Article 25 of the Universal Declaration of Human Rights (1948) states that 'everyone has the right to a standard of living adequate for health and well-being', of which access to clean water is a key element. This is further strengthened in the case of children (Article 22 of the Convention on the Rights of the Child) as 'access *inter alia* to clean drinking water, taking into account the dangers and risks of environmental pollution'. Clearly, the social dimensions of water use are central to the formulation of strategies for integrated water resources management.

Competition Between Main Water Uses

7. The lack of adequate supplies of water of sufficient quality causes intense competition between different users, particularly with increasing demands from industry. Since the chief aim of hydrological management has been to speed up economic development, water management plans are often not based on a comprehensive assessment of the full economic, social and cultural costs and benefits of alternative allocation strategies. Often, the resulting allocation is inadequately planned, inefficient, unsustainable and inequitable, discriminating against the urban and rural poor.

Agriculture

8. Agriculture is a major water consumer (estimated at about 70 per cent globally), but often performs poorly, wasting as much as 60 per cent of the water before it reaches the intended crop through inadequately planned and designed irrigation systems and poor operation and maintenance. Moreover, misapplied or poorly-drained irrigation water is a major source of soil waterlogging and salinisation, and of degradation of surface and groundwater. Although the water quality requirements of agriculture are low, the sector is often a user of bulk volumes of high quality groundwater, resulting in intense competition with other

users, usually to the detriment of domestic users but also certain sectors of industry that require relatively high quality water. Agriculture is also a diffuse source of pollutants, from the extensive use of pesticides and fertilisers, and from turbidity and sedimentation from soil erosion through land clearance and tillage. In some countries this renders the water unusable for other sectors.

9. There are great pressures on countries to protect agricultural production. An estimated 840 million people around the world, mainly in developing countries, do not have enough food to eat. Countries experiencing large population increases and those with agriculture-dependent economies are confronted with the prospect of having to produce more food from less per capita arable land and a reduction in water available for irrigation. It has been suggested that as agriculture is often a heavy water user, it may be more cost-effective on a national scale to allocate scarce water resources to urban and industrial uses and place a greater reliance on food imports. However, this policy choice has significant implications for food security, the balance of payments and national or regional political stability.

Industry

10. Industrial activity currently accounts for an estimated 23 per cent of water consumption, and is increasing quickly. In several rapidly industrialising countries, the legislative environmental controls on industry are often weak or unenforced, and there are few or no economic incentives to use water efficiently and limit the discharge of pollutants. The necessary capital, technology and know-how to implement the required measures is also often lacking. As a result, excessive amounts of water are used and significant pollution is generated. Often, industrial and urban developments share the same watercourse with sometimes disastrous results. In some countries, tourism is also an important sector for economic development. It is an intensive user of water and a major source of sewage effluent (especially in some small islands), and the seasonality of demand adds an extra difficulty for authorities in allocating resources between competing demands.

Ecosystems

11. Ecosystems are increasingly being seen as a user of water resources in competition with other users, yet they are important providers and regulators of water resources, both in terms of availability and quality. Over-abstraction of water resources and pollution are having dramatic impacts on ecosystems. However, because of the paucity of data on the ecological and economic consequences of these impacts, the effects on ecosystem and riparian agriculture are often overlooked in water resource allocation decisions.

Institutional Issues

12. In many countries, institutions remain relatively weak without the resources or policy instruments to implement effective control over the management of water

resources. Institutional strengthening is required in order to achieve effective strategy development, with associated capacity-building to ensure that the new approaches are sustainable.

13. Responsibilities for water management are often fragmented between different line ministries responsible for agricultural use of water, municipal use and healthcare policy. Consequently, policies and plans which impact on the management of freshwater resources are often un-coordinated, leading to inefficiencies and conflicting mandates and objectives. Furthermore, in many countries the legislative framework is too weak to support implementation of effective water management, in terms of the regulation of consumption and control of pollution. It also tends to inhibit investment in infrastructure and services.

14. Institutional weaknesses are further aggravated by lack of access to accurate data on water quality and quantity. Other socio-economic, environmental and spatial data which are also important for effective policy development are also often lacking. The net result is that it is often not possible for governments to assess the state of available water resources, to evaluate the current and future impacts of socio-economic activity, and monitor the effects of implemented plans and programmes. In addition, many countries also lack access to research and technical know-how. Often, the skills and knowledge base among institutional staff are inadequate to meet the challenges of effective management of water resources, and there is a pressing need for training at all levels in technical and management skills.

15. Experience has shown that the involvement of all stakeholders in the development of water policies and projects plays a key role in their successful implementation, by ensuring that the needs and priorities of the stakeholders are fully taken into account. Local communities, industry, agriculture, service providers, regulators, local authorities, non-governmental organisations and other interested parties therefore need to be involved more actively in planning and implementation. The participation of women is particularly important, since in many countries women frequently play an important role in small-scale farming and in the operation and maintenance of community water and sanitation systems. They also bear much of the burden of inadequate service provision.

Valuation and Pricing of Water Resources

16. Despite the number of countries predicted to suffer from serious water shortage now and in the future, and the enormous numbers of people who do not have access to safe water, water is still an undervalued resource. Some users (often the poor) continue to bear inequitably the cost of the actions of others, and water resources continue to be used inefficiently.

17. At best, water is priced according to marginal costs of supply, and in many countries it is a free good. There are thus few incentives for users to minimise their

consumption of water, or the discharge of pollutants. Users may pay service charges but these usually cover only operational and maintenance costs; annualised capital costs are very seldom covered. Almost nowhere is full-cost pricing of water carried out, although there are plans to do so in some countries. This would internalise the external environmental costs of water provision and use, such as watershed management, the impacts of over-abstraction, monitoring and remediation of pollution.

18. Where charges are made for water use, these are often inequitably applied. Charges are generally only levied on domestic and industrial/commercial users but frequently do not correctly reflect the relative impacts of those uses. With the exception of water provided through irrigation schemes, water use in agriculture is seldom priced. This generally reflects difficulties in monitoring and property rights issues.

19. While users are often willing to pay for water because they recognise the benefits (e.g. time savings, health, amenity, productivity), there are also external benefits which accrue to society as a whole, for which the individual should not be expected to pay. These include increased productivity, reduction in water-borne diseases, reduced spending on public health and reduced migration to urban areas. Strong arguments therefore continue to be advanced for provision of services by governments and the maintenance of subsidies.

20. However, many governments are increasingly finding it difficult to meet the full costs of provision, and subsidies have generally been mis-directed, benefiting higher-income groups rather than poor people. The additional financial resources to meet basic water needs for all developing countries have been estimated at approximately US$10 billion per annum for high cost urban systems (WHO, 1990), and approximately US$5-9 billion per annum for low-cost rural and peri-urban systems using low-cost technologies (UNICEF, 1994). There is a need to find ways of mobilising new money for investment in service provision, both from public and private sources as well as through public/private partnerships.

21. Low water prices and poor cost recovery have led to poor financial performance of utilities, which threatens the financial sustainability of service provision and the ability to attract investment or to maintain and extend infrastructure. Until these issues are addressed, it will remain difficult to attract the investment needed, particularly from the private sector.

Co-operation Among Riparian States

22. Two-thirds of the world's major catchment areas are shared by several states, and about 300 major river basins and many groundwater aquifers cross national boundaries. Where the resource is limited and there is insufficient consultation and dialogue among riparian states, this may lead to conflicting objectives and negative socio-economic and environmental impacts.

23. The rules of international law to protect freshwater resources, including international watercourses, from pollution and over-use, have been relatively piecemeal and ad hoc (for example, the 1996 International Law Association's non-binding Helsinki Rules on the Uses of the Waters of International Rivers; the 1982 Rules on Water Pollution in an International Drainage Basin; and the 1986 Rules on International Groundwater). However, the Convention on the Law of the Non-navigational Uses of International Water Courses, adopted by the UN General Assembly in May 1997, is intended to define a set of global principles and rules applicable to the utilisation, management and protection of shared water resources. A wide range of regional transboundary water agreements already exist, dealing with rivers, lakes and other water bodies (examples include the 1995 SADC Shared Watercourse Systems Protocol; the Agreement on Co-operation for the Sustainable Development of the Mekong River Basin; the Declaration on Co-operation by the Danube States; and the 1976 Rhine Chemical Pollution Convention).

24. Agreements which have tended to focus on pollution control or biodiversity protection have generally been quite successful in achieving their objectives. However, with some exceptions, agreements mainly concerned with sharing the quantity of available water have been less successful. Since international sharing of water resources continues to be a complex and sensitive issue on which they are diverging views, further technical work and consensus building is needed to promote co-operation among riparian states.

International Conventions with Implications for Freshwater Management

25. A number of international conventions are directly or indirectly linked to issues of water resources management. There is a need to take account of relevant commitments under these conventions in the development of policies for freshwater management, as the success of actions to implement these commitments will be affected by the outcome of water policy choices. Win-win outcomes can be achieved through better integrated management of land and water use, which will also contribute to the fulfilment of international commitments. In some instances, sources of international finance such as the Global Environment Facility (GEF) are available to assist with the cost of these actions. *Box 1* gives examples of the major conventions' linkages with freshwater resources.

26. The Conventions on Biological Diversity and Wetlands (Ramsar Convention) share a number of goals and objectives related to the conservation and sustainable use of natural resources, including freshwater. The Secretariats of both Conventions are drawing up a joint work plan which focuses on wetlands as central unifying ecosystems for biodiversity conservation.

The Problems of Small States

27. Small states account for more than half of the Commonwealth's members, and the majority of them are small island developing states (SIDS). Several of them face serious vulnerabilities and constraints in relation to freshwater and urgently need to develop integrated, sustainable and long-term water management strategies, as recommended by the 1994 Barbados Programme of Action.

Box 1 Major International Conventions Affected by Freshwater Management

Convention on Biological Diversity - Sustaining the functioning of ecosystems as important reservoirs of biodiversity requires the maintenance of many biological processes, which are often extremely complex. However, it is clear that the quantity and quality of available freshwater is inextricably linked to ecosystem function and balance, and changes in one will inevitably affect the other. It is thus important that water management policies take account of actions to implement the Convention.

Ramsar Convention - Freshwater wetland ecosystems are important water quality regulators, and coastal wetland systems provide a buffer between land and sea and provide habitats for many aquatic and terrestrial species. Wetlands are also important repositories and stores of palaeontological information and also contain a large genetic reservoir of plant and animal species. Water levels and quality are profoundly important for the healthy functioning of wetland ecosystems. Hence, in order to achieve the Convention's aim of wise use through national action and international co-operation, national water management policies need to take account of the requirements of wetland ecosystems.

Convention on Desertification - The Convention concerns those countries experiencing serious drought and/or desertification, particularly in Africa. There are strong causal links between land and water use practices and the severity of drought and desertification. Measures to prevent or mitigate the impacts of drought and desertification under the Convention will inevitably need to be a planned and integral part of a programme of water resources management for those countries affected.

Convention on Climate Change: Changes in prevailing climate patterns and increased climate instability is likely to cause major changes in the availability of freshwater resources around the world, and an increased likelihood of flooding and drought. In addition, the predicted rise in sea levels will increase the incursion of seawater into coastal wetland areas, deltas, lower river reaches and groundwater. Together, these factors will increase the strain on the already fragile balance between supply and demand in many countries. Clearly, efforts and commitments in support of the objectives of the Convention will contribute to attempts to safeguard freshwater resources, and need to be integrated within water resources management strategies.

United Nations Convention on the Law of the Sea (UNCLOS) - UNCLOS governs all aspects of ocean space, including environmental control. Under the Convention, states are obliged to prevent and control marine pollution and are liable for damage caused by violation of their international obligations to combat pollution. Contamination of the world's rivers has a significant impact on the marine environment, and clearly it is essential to manage freshwater resources to minimise pollution effects in coastal waters and oceans.

28. Many SIDS rely either on single aquifers or on a limited number of watersheds, and inadequate action to safeguard these sources poses a significant threat. Pressure for land and forest resources can result in deforestation and soil erosion, thereby causing degradation of catchment areas. Over-abstraction of groundwater increases the possibility of saline intrusion into aquifers. Urban population growth, changes in economic strategies and a growing per capita use of water are significant challenges, and water supply and sanitation are high priorities. Even where rainfall is abundant, access to water is limited by inadequate storage facilities and effective delivery systems. Tourism is a key sector in the economic development of many SIDS, but it is also an intensive user of water resources.

29. Several small islands are particularly vulnerable to the effects of global warming and sea-level rise, which increases the likelihood of saline intrusion into aquifers. Climate instability is expected to increase the frequency of floods and droughts, and in small islands which are already exposed to extremes of weather, more frequent and intense storm events are expected to have profound economic and environmental effects, with implications for freshwater. Effective adaptive response measures, especially in relation to freshwater, are therefore of paramount importance to these states.

II. AN AGENDA FOR ACTION

30. The strategic issues outlined in the previous section suggest that action will be needed at several levels in order to promote the sustainable use and management of freshwater resources. A possible agenda for action is set out below, with an emphasis on national policies and measures. The ways in which greater international assistance and Commonwealth co-operation can support national efforts are also discussed.

Developing an Effective Policy Framework

31. It will be beneficial for all countries which have not yet done so, to develop coherent national policies on freshwater, appropriate to their specific conditions and circumstances. These policies need to be based on an integrated approach, taking into account the full range of ecological, economic and social factors and needs. Water must be recognised as both a social and an economic good, vital for the satisfaction of basic human needs, food security, poverty alleviation and the protection of vital ecosystems.

32. The value of adopting an ecosystem-based management approach is being increasingly recognised[1]. This aims to meet human requirements for the use of

1 For example, the Convention on Biological Diversity is formulating an ecosystem-based approach for inland water systems to achieve conservation and sustainable use of inland waters and the fair and equitable sharing of the benefits these provide.

freshwater, while maintaining the biological diversity, hydrological and ecological processes necessary to sustain the composition, structure and function of the ecosystems that support human life and provide the resources needed for economic development. It seeks to consider all relevant and identifiable costs and benefits (ecological, economic, social, cultural and political) of alternative management options to all stakeholders, and ensure that the policies adopted are sustainable and command the support of stakeholders.

Cross-Sectoral Integration

33. Since water is a finite resource, its allocation between different sectors and users will inevitably involve compromises. The adoption of a cross-sectoral approach in policy formulation will help to achieve equitable, optimal and sustainable (environmentally, economically and socially) uses of water.

34. The close links between land use practices, and the effects on water quality and availability, require water resources management policies to be more closely integrated with land use management policy and plans. Similarly, water policy issues cannot be separated from health and other social policies, nor environmental policies.

Catchment Area, Demand Management and Conservation

35. Each individual water user in a catchment area can potentially affect and be affected by a large number of other users within the same catchment. Hence, in order to ensure the equitable distribution of available resources and the equitable sharing of responsibility, it is essential to consider the catchment as the basic unit of management, in formulating water policies.

36. There needs to be a greater emphasis on demand side management. This can not only conserve water resources, but also be a cost-effective way of extending service provision, postponing the sourcing of new water and stemming the loss of income to potential service providers. (For example, instituting water efficiency measures reduced the consumption of water in the city of Madrid by 25 per cent between 1992 and 1994, which is the equivalent of a reservoir providing over 100 million m^3 of water per year.)

37. Measures could involve the promotion of technical solutions, information and awareness-raising campaigns to increase knowledge about the value and scarcity of water, as well as economic instruments to reduce consumption and waste based on the user pays and polluter pays principles.

38. There is particular scope for demand reduction in the agricultural sector. Efforts could focus initially on irrigation techniques and the repairing of delivery systems. However, depending upon national circumstances and priorities, there is

also scope for a more fundamental review of the strategic importance of the agricultural sector in comparison to other possibly more cost-effective uses of water resources, with due regard given to the implications for food security.

Pollution Prevention and Control

39. Strategies to prevent and reduce industrial pollution would be more effective, if they incorporated the following elements:

- legislation to regulate discharge of wastewater, as well as effective monitoring of discharges and enforcement of standards;

- economic instruments based on the polluter pays principle, e.g. taxes or levies on polluting effluents; and

- promotion of the use of environmentally sound technologies through information dissemination, and provision of economic incentives.

2. Experience also shows that controlling industrial pollution has the secondary benefit of reducing the amount of water used per unit of output, revealing a powerful and cost-effective way of tackling urban water problems.

3. It is more difficult to control non-point sources of pollution (*e.g.* from agriculture) because it is often not possible to link individual polluters to the pollution for which they are responsible. However, some policy instruments do not require this link to be established, e.g. education campaigns about health and environmental consequences, and economic instruments based on consumption of agricultural inputs (e.g. fertilisers). In several countries, the removal of subsidies on agricultural inputs which are pollutants has been an important first step.

Increasing Access to Potable Water and Sanitation

4. A commitment to improving public access to potable water and adequate sanitation should be central to a strategy for integrated water resources management in countries where large sections of the population do not have these amenities. Three major lessons from experience during the International Drinking Water and Sanitation Decade of the 1980s are pertinent:

- supply and sanitation systems must respond to local demands and should be simple, efficient and easy to operate and maintain;

- the involvement of local communities and households, particularly women, in system design and maintenance is a crucial component to a project's success; and

- as far as possible, water should be treated as an economic commodity paid for by users.

Drought and Flood Preparedness

2. Countries which are particularly at risk need to develop action programmes to deal with the increased likelihood of droughts and floods, as part of a water management strategy. These should include early warning systems and mitigation plans at the local and national level, including vigorous erosion control measures and re-examination of drainage design criteria. There is also a need to establish or strengthen mechanisms for regional consultations on drought and flood preparedness, and it may also be possible to establish regional or international emergency funds or collective insurance programmes.

Institutional Strengthening and Capacity-Building

44. These are essential requirements in preparing and implementing sustainable water strategies, and should address needs at all levels of authority, including local communities. Women, youth, NGOs and indigenous people, in particular, need to be brought into capacity-building strategies. Government efforts can be supported by international, regional and national agencies, and by NGOs and the private sector. Some of the key areas where action is needed are outlined below.

- ***Participation*** - Stakeholder participation needs to be effective at all levels and stages in the development and implementation of water management plans and programmes, from the identification of priorities to implementation and evaluation of projects. The consultation process should involve local communities, industry, agriculture, service providers, regulators, local authorities, and non-governmental organisations, and must be credible, open and transparent. Collaborative management agreements between governments and local communities can be encouraged, and programmes to raise awareness and encourage involvement, particularly among women and youth, are vital.

- ***Training*** - Institutions at all levels need well-informed staff with an appreciation of the wide range of issues relevant to water resources management and allocation. Training is an essential element, and must be adaptable to meet a multiplicity of needs. Professional technical advisers require formal training courses, for example on water resource planning and wetland management, while local community representatives may be best trained through methods such as participatory rural appraisal (PRA) or through visits to demonstration projects. There is also a need to build expertise on the scientific and socio-economic aspects of water management, such as

ground water characterisation, remote sensing, valuation and the economics of water.

- ***Strengthening Regulatory Frameworks*** - In order to provide the necessary framework for the implementation of strategies, it is necessary for many countries to address deficiencies in legislation and regulation of water resources and their use. Legislation needs to address issues of ownership and property rights, the economic and social values of water and pollution prevention and control measures. In addition to strengthening legislative frameworks, there is also a need to improve implementation and enforcement of regulations and laws.

- ***Institutions for Conflict Resolution*** - As supplies of freshwater become more scarce, users and other stakeholders must reach a consensus on needs, negotiate solutions and collaborate on the long-term conservation of water resources and biodiversity. Currently, there is a need to strengthen capacities for conflict management at a number of different levels. At local, district and national levels, independent water commissions can be established which have the authority to arbitrate and adjudicate between water users and ensure equitable distribution of water-use rights.

- ***Technology Transfer*** - Governments, industry and international organisations need to promote technology transfer and research co-operation to foster sustainable water management and use. This would involve the adaptation and diffusion of new and innovative techniques and technologies - both private and public - and the transfer of technologies to developing countries, including on concessional terms, as mutually agreed, taking into account the need to protect intellectual property rights. However, the technology must be appropriate, both in terms of the ability of local people to maintain the system and in its impact on the environment. In this respect, local and traditional technology can have much to offer, especially since they involve the use of local equipment and materials. This knowledge can be promoted, and South-South co-operation encouraged.

- ***Information Resources*** - It is important to assess existing information resources and identify gaps which need to be filled to support policy formulation, planning and investment decisions, and the operational management of freshwater. Institutional capacity to interpret information and data also needs strengthening. International co-operation can facilitate some types of research and information acquisition and dissemination. These might include:

(i) successful technologies;

(ii) water resources assessment and demand estimation / management;

(iii) institutional reform and policy development;

(iv) the economic and health costs of water pollution;

(v) transboundary river basin monitoring data; and

(vi) determination of water quality requirements for the maintenance of critical freshwater ecosystems as well as research on the economic value of the benefits of these ecosystems and the costs of their degradation.

Financing for Water

45. The Programme for the Further Implementation of Agenda 21 adopted by the June 1997 UN General Assembly Special Session, recognised that the intergovernmental process on freshwater to be launched by the CSD in 1998 will be fruitful, only if there is a proven commitment by the international community for the provision of new and additional financial resources to support global action on freshwater. A high priority must continue to be given to enhancing official development assistance (ODA) and concessional lending for the water sector, which is a major social sector, consistent with the new "strategic vision for development co-operation for the 21st Century", adopted by Development Ministers of the OECD's Development Assistance Committee and Heads of Aid Agencies in 1996. At the same time, improved co-ordination of assistance among bilateral and multilateral donors and more effective use of existing aid resources need to be pursued vigorously.

46. The strengthening of international assistance should be complemented by greater efforts to mobilise additional domestic resources as well as investments from the private sector. There is a need for innovative forms of financing and growing recognition that governments need to change their traditional role from direct providers of water and sanitation infrastructure to that of creating an enabling environment for more effective and efficient investments.

47. Existing domestic resources for the development and management of freshwater resources need to be used more efficiently. There are a number of opportunities for more effective use of public spending, including:

- re-allocation of public expenditure from low-priority infrastructure projects to the water sector;

- increasing cost recovery by water utilities (which may involve increasing the quality of service, metering, education and awareness-raising).

- removing subsidies except where these are carefully targeted to benefit low-income groups unable to pay for services; and

- the use of economic instruments to reduce pollution and increase efficiency of water use in major sectors such as agriculture, industry and tourism.

2. The role of the private sector in providing efficient and cost effective water services is also being more widely acknowledged. Water supply and sanitation have been successfully privatised in Britain and a few other developed countries, but usually after the infrastructure is fully in place and the profitability of operations is proven. However, there is also an increasing need for mechanisms to encourage private sector investment in new infrastructure, regardless of whether the infrastructure is publicly or privately owned. In order for private sector involvement to be effective, it is important to have the necessary legislation and regulations to facilitate cost recovery for capital, operating and reinvestment costs. The main options for private sector involvement, which could be explored, include:

- contractual arrangements with private companies for service delivery, operations and maintenance;

- franchising of services;

- sale of state owned infrastructure to allow reinvestment in basic services elsewhere;

- the formation of innovative public/private partnerships; and

- contracting out to non-governmental organisations or community groups.

2. The potential for forming public/private partnerships to increase investment in water infrastructure and services is particularly promising. For example, a British water company has recently entered into a three-year partnership with Trinidad and Tobago's Water and Sewerage Authority to help improve the management and provision of services. Such public/private partnerships can provide the added benefit of facilitating the transfer of technology and related know-how. In certain cases, ODA and concessional lending can be used to catalyse the formation of these partnerships.

3. There is growing experience of non-governmental organisations and civil society playing a key role in providing some of the additional resources needed, and evidence of communities' willingness to pay to cover the individual benefits that they derive from access to water. Lessons from grass roots sanitation projects (e.g. in urban areas in Pakistan and India) show that people are willing and able to pay for sanitation if costs can be controlled through self-build schemes and appropriate technology. Communities are able to mobilise significant resources (up to one month's income per household in many cases) if they have appropriate long-term incentives (e.g. land tenure), education and access to appropriate technology.

Water Pricing

51. The need for greater cost recovery of investment, replacement, operation and management costs for water services is increasingly recognised. Utilities and governments have been reluctant to connect new customers because water prices have been too low to re-coup the cost of investment. Water pricing policies need to ensure that those whose activities have an adverse impact on the water cycle contribute to the cost of management or remediation of that damage. It is important also to promote improved customer service in tandem with user charging, otherwise it will be politically difficult to persuade users to pay for an intermittent or otherwise unreliable service which traditionally has been free. Market-based instruments can be particularly useful in implementing more realistic water pricing policies. These might include:

- *Cost-Covering Charges:* In accordance with the polluter pays or user pays principle, service providers levy charges on users to cover the cost of provision and wider resource management. These usually take two forms:

  - *user charges*, where the charge is paid for a specific environmental service such as drinking water supply, irrigation schemes or wastewater treatment. In the interests of equity and ability to pay, differentiated tariff structures can be used.

  - *earmarked charges*, where the revenue from the charge is spent on related environmental purposes but not in the form of a specific service to the charge-payer, for example on capital investment, catchment management, monitoring or pollution abatement.

- *Incentive Taxes:* These are environmental taxes mainly intended to change environmentally damaging behaviour. The level of the tax is set either to reflect the marginal costs of damage (where these can be accurately estimated) or on the basis of marginal abatement costs (where the level of charge is intended to make investment in pollution abatement more attractive). Water pollution charging schemes have

been used most successfully in Europe and the US where provisions are made for revenues from the charges either to finance centralised treatment plants or to assist polluters taking pollution abatement measures.

Improving Co-operation Between Riparian States

52. A shared vision and greater co-operation in the management of international and transboundary watercourses, including groundwater, can help to maximise mutual benefits for riparian countries. As noted earlier, this is a sensitive issue on which there are diverging views about the role of the international community. Where it is appropriate to do so, co-operation among riparian states could be encouraged through assistance with the development of river basin management programmes; the gathering and exchange of relevant data and information, including hydrological and meteorological data; and joint studies to assess water resources and their quality and identify priority areas for action.

Intergovernmental Dialogue on Freshwater

53. Discussions in the preparatory process for the CSD's sixth session, on the modalities of future intergovernmental dialogue on freshwater (in the run up to the next comprehensive review of Agenda 21's implementation in 2002) identified the following options: (i) Address the issue of freshwater during one of the ad hoc inter-sessional groups of the CSD which will meet in the year 2000. (ii) Consolidate the work and functions of the UN Committee on Natural resources to provide the capacity for continuing dialogue on freshwater issues, subject to the outcome of ongoing discussions on the reform of the UN Economic and Social Council's subsidiary bodies. (iii) Organise a special inter-sessional meeting on freshwater in the year 2000, funded through extra-budgetary resources or sponsored by interested governments.

54. These options will be discussed further at the CSD. While the mechanism(s) for future international dialogue is an important issue, the content and quality of this dialogue is equally important. It would be most effective if it focused on ways of accelerating the implementation of existing intergovernmental commitments and agreements on freshwater, at national, regional and international levels, with agreement on the means of implementing these commitments (in terms of financing, technology transfer and capacity building). The dialogue could also focus on the measures needed to improve co-ordination of activities on freshwater within, and among, the major international organisations which are active in this area.

Commonwealth Co-operation

55. The Commonwealth encompases countries with a wide range of experience in different facets of water resources management as well as expertise in dealing with problems in this field. This experience and expertise can be harnessed to strengthen co-operation on freshwater issues.

56. The Commonwealth Secretariat's ongoing work, chiefly executed under its flagship programme on water resources, focuses on improving capacities for managing and improving the quality of groundwater resources; water resource management in small islands, arid and semi-arid areas; and water supplies in urban and rural areas, including the introduction of low-cost small-scale water treatment technology suitable for rural areas. A major recent project undertaken by the Secretariat is the establishment of a computer-based Small Islands Water Information Network (SIWIN) which is helping to disseminate information among water resource managers through electronic and print media. Another project is focusing on the biological control of waterweeds in the African region, increasing awareness of the severity of the problem and the range of options to address it. Building on Commonwealth experience, expertise and this work, the scope for strengthening co-operation in the following fields could be explored:

(i) Exchange of experience, information and expertise, as well as demonstration projects, in the following areas:

- Effective policy and regulatory frameworks for the integrated management of freshwater.
- Best practices in implementing measures to increase water-use efficiency in major sectors and to prevent and control pollution.
- The design and implementation of market-based economic instruments to promote conservation and sustainable use of freshwater.
- Mobilisation of private investment in the water sector, including privatisation.
- Environmentally sound water-related technologies.

(i) The provision of scientific advice, technical assistance and training, at the request of governments, to strengthen human resources and institutional capacities in key sectors of water resources management, with particular attention given to the special needs of small states.

(ii) The creation of a Commonwealth-wide water information network (linking water experts and institutions) patterned along the lines of the existing SIWIN network for small islands.

(iii) The promotion of public/private partnerships to increase investment in water infrastructure and services. Bodies such as the Commonwealth Partnership for Technology Management and the Commonwealth Business Forum could be encouraged to develop such partnerships.