

Water and the environment in Ethiopia

Mateos Mekiso

Environmental Protection Agency (EPA), Addis Ababa, Ethiopia

Abstract

It is generally recognised that fresh water is regarded as one of the most important natural resources for all socio-economic development and a basic input for environmental management. Failure to successfully develop and appropriately utilise this resource leads to a progressively declining economy and degraded environment.

In Ethiopia, despite the huge potential of fresh water resources, recurrent droughts and rapidly progressing desertification have disrupted food and fibre production systems. Food shortage and starvation is ever increasing. The national economy is either stagnant or declining while population size is rapidly increasing. Domestic water supply is at its infancy. Potentials in irrigation and hydropower are also hardly exploited. The cumulative effect of these has reflected on overall poverty and associated environmental degradation.

In view of the above-mentioned issues, the need to develop and utilise the available water resource in the country is discussed in this paper. The discussion is focused on the relationship between water resources, the environment and poverty.

Introduction and background

Water is a precious natural resource, vital for life, development and the environment. It can be a matter of life and death, depending on how it occurs and when it occurs and how it is managed.

Irrespective of how it occurs, if properly managed, water can be an instrument for survival and development. It can be an instrument for poverty reduction. Access to safe water and sanitation to meet human and livestock needs is a prerequisite for sustainable development.

However, when inadequate in quantity and quality, it can rather serve as a limiting factor in poverty reduction and overall national development, resulting in poor health and low productivity, food insecurity and constrained economic development. It is therefore imperative that the linkages between water development initiatives in the agriculture, food, energy, health, education and decentralised governance sectors be clearly understood and carefully managed to benefit from the inherent synergies and to minimise or avoid negative cross-sectoral impacts.

It is on this basis that water is one of the most essential substances for the sustenance of life. It is generally recognised that fresh water is the most important natural resource in all

socio-economic development endeavours and indispensable input for environmental management. It is an important component of every type of environment where life is found. Successful management of the environment, therefore, can never be achieved in isolation from appropriate management of water resources. Water is a product of the environment, and vice versa, as it comes as rain from the environment and goes through land, which is the major component of the human environment and ends up in the sea or in the land. Managing water is thus intimately linked with managing the environment—all terrestrial, aquatic and atmospheric resources including human welfare.

Based on the bond between water resources and the environment, integrated water resources management is gaining paramount importance worldwide. In pursuit of integrated solutions, it is observed that decision-makers and planners tend to be oriented towards the management of water while preserving the environment through appropriate legal tools and sustainable actions of development.

Integrated management of water resources entails co-ordinated development of water, land and related resources to maximise socio-economic benefits and preserve the sustainability of the ecosystems. Being viewed as comprising an ecological system of interdependent components, the water system interacts with land, environment and other related political and economic systems. The whole process should be directed towards the assessment of water needs, sources, the causes of water related problems, and means to optimise the utility and equitability among stakeholders throughout the water system management.

Although implementing water resources in an integrated manner is important, its management is complex. The complexity also differs across place and time because the integration entails needs and equitable distribution of water for all domestic utilisation and agricultural and industrial use together with the need for ecosystem management. These require co-ordination, harmonisation and reducing temporal availability constraints and situational pressure. Effective co-ordination and integration between the water system and other systems require efficient decision and controlling mechanisms that are based on knowledge of water acquisitions, development and efficient allocation to different socio-economic and ecosystems management activities. The need for such connection in the water system is due to the fact that water has economic, ecological, social, cultural and religious value.

The state of water resources in Ethiopia

Ethiopia has 12 major river basins/valleys, 11 lakes, 9 saline lakes, 4 crater lakes and over 12 major swamps. The total mean annual flow from all the 12 river basins is estimated to be 123.25 billion m³. Based on this information, it is always stated and often quoted that 'Ethiopia is the water tower of East Africa'. The country can only be a water tower in terms of receiving ample water and donating it to neighbouring countries but not in terms of ample water resources that is readily available for use. This is because, most of the major rivers have created deep gorge in the country and the water they contain passes to neighbouring countries, thus constraining development and utilisation of the water resources in the

country. In addition, uneven spatial and temporal distribution of the available water resources either demand huge investment to develop and extend to the water scarce areas or constrained the utility at required time and place. This is again due to the fact that most perennial springs and streams exist only in the highlands comprising just over 40% of the country's geographic area, whereas there is hardly any surface runoff and perennial springs and streams in areas below 1500 metres above sea level (masl) that comprise over 55% of the country. Even the country's estimated 2.6 billion m³ ground water which, fairly distributed in the lowlands, could not be appropriately developed and utilised because of financial and capacity problems. Such failures in developing and utilising the country's water resources and mismanagement to the sparsely available water have already been reflected as a root cause for overall environmental degradation.

Problems associated with water management and the environment

Environmental risks and/or benefits are often related to the way natural resources are managed. Environment is defined as related to a range of natural resources it contained, the interactions between the different resources and the state of resources in space and time. All living organisms and their habitats are dependent on the availability and quality of water resources. Therefore, there is no such thing as managing environment without managing water resources and vice versa. We therefore could conclude that environmental risks and benefits are often related to the way in which natural resources, in general, and water resources, in particular, are managed.

The important interacting variables in environmental management is the water management system we choose; the use we make of the water; the quality and quantity of the water; and the nature and quality of the environment. The interactions between these variables often emanate problems in water resources management and utilisation because the process of water resources management and utilisation would modify the natural water systems. The process may also affect the quality and quantity of the water at the envisaged users level.

The water resources management, therefore, has to consider the heterogeneous nature of the environment, i.e. the nature of changing from place to place, that is spatial and temporal, or fragility of resources' associations and their environment. Different environmental issues would demonstrate this idea. For example, irrigation often causes severe salinity in arid lowlands while its environmental and socio-economic benefit in the humid areas is far greater than its adverse impact on the environment, with the assumption that the design and management of the irrigation in both areas are similar. However, good designs and pre-informed management actions avoid the adverse impact at any place. Similarly, mass deforestation of an area creates adverse impacts on water resources quality and quantity and the environment. It leads to soil system impediment and adversely affects the process of infiltration creating temporal floods, soil erosion and general environmental degradation. Reforestation and increased organic contents in soil acts inversely. They

increase water infiltration rates; create clear and sufficient water; improve general environmental conditions in which diversity of terrestrial and aquatic organisms flourish.

The water management and utilisation problems as related to the environment in Ethiopia are not limited to uneven distribution of water resources and human actions. Natural calamities have also posed severe problems. Ethiopia and its eastern neighbouring countries were severely stricken by recurrent droughts from 153 to 242 BC, during which water flow in the river Nile was tremendously reduced. These droughts, however, affected small portion of the country and imposed less famine in Ethiopia. The extent and frequency of the famine has gradually grown until 1975, when thousands of people lost their lives. This called not only for national attention but also for global attention that after then some actions on the idea of conserving and managing environment and water resources has emerged. By the time, however, the water systems and the environment in most parts of the country had lost or severely reduced their resilience that the resources were susceptible for slight touches. The emerged actions have not been able either to reverse or stop the resource degradation and climate problems such that currently aridity has widened its scope in the country. Now it is estimated that 65 to 70% of the country's total geographic area fall under the United Nations' definition of desertification.

Although desertification is degradation of land in arid, semi-arid and dry sub-humid areas, the main element of desertification is unavailability of water resources. This renders the ecosystems in the affected areas fragile. Desertification does not refer only to the expansion of already existing desert but also over-exploitation and inappropriate use of resources in dry ecosystems. Deforestation, overgrazing, misdesigned and mismanaged irrigation practices, poverty, political instability and inappropriate macro policy directions can all adversely affect natural resources and land productivity leading to desertified environment. The results are often loss in biological productivity, disturbed and deteriorated water cycling, and loss in economic productivity, famine, starvation and general poverty ranging from household to national level. Thus poverty goes back to further over-utilisation of resources including water, and to environmental deterioration creating vicious circle to the process.

The above stated environmental problems have already taken place in Ethiopia. Clearing of forests, over-grazing and other reductions in the vegetation of the country has increased considerably during recent years. Increased silt and nutrient load of the watercourses due to increasing populations and the above-stated negative environmental products have posed serious socio-economic and environmental problems. The episodes that encourage soil erosion (depleted forest, inadequate plant cover, poor soils, improper farming methods etc.), and inappropriate management systems of water resources (at micro-level) have alarmingly taken place and most of the water systems and the environment have suffered from the consequences of the linked processes (Zinabu 1998).

The overall product of the problems is poverty. Of a total population of about 67 million people, it is estimated that close to 30 million live in absolute poverty. A report prepared for the 'World Summit on Sustainable Development' reveals that the household income, consumption and expenditure survey conducted in 1995/96 and published in 1999, estimated that:

- i. forty-six percent of the population subsists below the poverty line

- ii. although poverty is widespread in the country, it is more prevalent in the rural areas where 47% of the population is poor compared with 33% in the urban areas
- iii. average per capita income (US\$ 167) obtained from the survey is very close to the national poverty line (US\$ 165) indicating that the whole nation is on the verge of poverty.

Several indicators raise the alarm that poverty is further deepening. For example, per capita food production has been declining since the 1960s indicating that the ability of the rural population to feed itself has been deteriorating. The average annual yield of cereals in the years from 1980 to 1995 showed no improvement showing that agricultural performance was stagnant throughout the 1980s and most of the 1990s while population growth is increased by 3% annually. Furthermore, the number of relief recipients is increasing tremendously both in the urban and rural areas. Poverty also hampered the provision of social services. The level of satisfaction in the basic needs such as water supply and sanitation, health, education and even shelter is low. For instance, only less than a quarter of the rural population has access to drinking water supplied from protected sources. Electricity is used as a source of energy for cooking by only 0.38% of the households. The rest depend on woody biomass, crop residues and cow dung. These had multiple adverse impacts both on water resources management and the environment.

Actions taken to reverse the trend

Policies and strategies

Although the severe poverty at micro-level creates problems on wise management and use of natural resources, the Government of Ethiopia is well aware of the problems. Accordingly, the constitution and many sectoral and cross-sectoral policies have given due attention to sustainable development, in which the management of natural resources and the environment are focus areas. A couple of policies and strategies are raised as example.

The constitution of the Federal Democratic Republic of Ethiopia (FDRE) set clear economic development policy in general and gave due consideration to environmental and socio-economic issues in particular. All sectoral and cross-sectoral policies developed and legislation enacted have been based on the general statements in the constitution.

The economic policy emphasises sustainable development that shall be based on integrated approach to rural development. It clearly states that all development actions should consider the wise management of natural resources and the environment. It pays due attention to water resource development and management with statement 'without water agriculture is unthinkable'. It further states that if the supply of water is higher or less than the required amount or if it is not available at the right time, production would significantly decrease or even be zero.

Environment policy and conservation strategies of Ethiopia on their part provoke people-centred and environmentally sustainable development. The policy affirms the need to ensure sustainable use and management of environmental resources and the wise use of

non-renewable resources. It cautions stakeholders to the extent possible when managing the trade-off between short-term economic growth and long-term environmental protection. Additionally, it underscores the need to correct for market failures, and ensure social equity in the use of environmental resources. It further advises that regular and accurate assessment and monitoring of environmental conditions be conducted and the public be duly informed on the outcome. On the investment side, the environmental rights are safeguarded by a legal requirement that deploys the Investment Authority to ensure that the intended investment activity complies with conditions in the environment protection laws.

As regards to water resources management, comprehensive and considerate of all sector and cross-sector development water policy or strategy and 15 years development and management programme have been prepared that are now ready for action. The water resources management policy reinforces the prosperity, harmony and environmental health elements of the unstated vision through the policy's fundamental principles, which recognise that water is a commonly owned economic and social good that should, as much as possible, be accessible to all in sufficient quantity and quality to meet basic human needs. The principles further emphasise, among others, the need for a rural-centred, decentralised, integrated and participatory water management system. They also emphasise the attainment of social equity, economic efficiency, empowerment of water users, sustainability of water management, promoting self-financing and cost recovery. In using water resources, ensuring environmental soundness of all water resources development activities, and ensuring sound water governance regimes at all levels of governance are further required.

Conservation and development

Many different environmental management actions including forest resources management and development, soil and water conservation, dry lands water and pasture resources development and management etc. received attention since the 1970s. The actions were conducted in isolation from each other that integrated management systems were not designed and developed. The failure to design and implement actions in an integrated manner has contributed to less than effective actions.

Currently, however, an integrated approach to resource development and environmental management has been designed into the River Basin Master Plans. Resource inventories have been conducted for most of the river basins and compiled at individual river basin levels. The compilations indicate the state of all resources including land, water, floristic and faunistic resources and existing management options and constraints. Based on the knowledge of resources, management constraints and options, long-term (30–50 years) priority areas of intervention have been proposed in each master plan from which priority actions have already been adopted in the so far prepared water sector development programme. Again, the water sector development programme considers integrated socio-economic development with water resources playing a major role in development.

Furthermore, the Sustainable Development and Poverty Reduction Programme Ethiopia calls for the water supply coverage of urban, rural and country level at 82.5, 31.4

and 39.4%, respectively, from 2002–05. The programme has planned to annually increase urban sewerage coverage by 3.5% from its current level of 7%. It has further planned to develop irrigation schemes that cover 29,043 ha and small-scale irrigation that cover 23,823 ha with expected total beneficiaries of 207,900 households.

Conclusions

Different natural resources in Ethiopia complement one another. Any successful management of the environment depends on the management and utilisation of other resources, especially water resources. Again, water resources cannot be successfully managed in isolation from other resources. Integrated approach to the resources management is indispensable for sustainable management of all individual resources including water resource in particular and the environment in general. The approach in the River Basin Master Plans is encouraging and it should be strengthened.

The country has enacted a number of legal tools that are very important for the successful management of water resources and the environment. The major drawback is failure in implementation of the prepared programmes, policies and strategies, which are based on dependable information and deep consultative processes.

Furthermore, poverty affects not only socio-economic performance and human welfare but also the natural environment at large. Combating poverty has already received attention from the Government of Ethiopia and a poverty reduction strategy and programme has already been prepared. One among many issues of the strategy and the programme is water resources development for irrigation and other uses. This is basic for countries like Ethiopia that are frequently stricken by droughts.

However, although all scales of irrigation are important for Ethiopia's agricultural productivity and production, planning for the irrigation development should consider short- and long-term irrigation components. In the short-term, small-scale irrigation, especially those, which complement local knowledge and affordability, should receive greater attention for many different reasons including the system efficiency and environment friendliness.

One, therefore, strongly argues that the water resources management process should be started and strengthened at the grassroot/community level because local people understand that water is a precious natural resource, vital for life. Attention should, therefore, be given to small-scale irrigation, which is already known and practised by the local communities. The only need is to encourage and strengthen the practice and avoid possible conflicts during irrigation water use. Furthermore, small-scale irrigation is efficient in water resource utilisation (less evaporation and percolation wastage, less salinity to soil and ground water, less conflict arising with down-stream users, environmentally friendly in general etc.). The short-term food production programme and water resources management programme thus should consider small-scale irrigation in all possible vicinities.

In addition, there should be a greater effort to expand capacity and satisfy energy needs, at least in urban areas, so as to reduce fuel wood pressure from woody biomass, crop residues and cow dung that should be returned to the soil and enhance land productivity and

production. Water resources, as far as financial resources allow, should primarily play this role.

Reference

Zinabu G. 1998. Human interactions and water quality. In: *Proceedings of the 1997 AAAS (American Association for the Advancement of Science) symposium on emerging water management issues, Philadelphia, USA*. AAAS, Philadelphia, USA.