

Fresh Water and the Environment

M. Lakshmi Narasaiah

Department of Economics, Sri Krishnadevaraya University, Anantapur 515 003, Andhra Pradesh, India

KEY WORDS Sustainable Management. Drinking Water. Pollution. Population Explosion.

ABSTRACT The escalation in the population and the quest for continued development is leading to conflicting pressures on water resources. Such resources are the ultimate recipient of pollution from various socio-economic activities associated with urbanization, agriculture, mining and clearing of native vegetation. This makes water supply and health perhaps the most important issue for the larger proportion of the global population. Paradoxically, the demand for "Sustainable management" and increasing global population require more potable water from a declining available water base. The effectiveness of water management will depend in large measure as the hydrological education of the general public. Water is an essential factor in a large number of productive activities, of which one of the most important is the production of food by irrigation. This activity accounts for two thirds of the water resources used by humanity. A supply of drinking water and sanitation in urban centres are crucial for preserving human health. Since each watershed or river basin's system has developed gradually and has grown up according to the yearly distribution and fluctuations of rain fall, any redistribution of water by means of pipes, as if it were gas or electricity, is a journey in to the unknown. This is because it destroys the results of the work of shaping the climate, however transitory it might be. Water consumption has increased in the recent past with the spread of irrigation and industries by increasing the dumping into large lakes and seas which cannot be cleaned. This is the price we pass on the future generations, a comfortable attitude but an unacceptable one.

Water is going to be one of the major issues confronting humanity at the turn of the century and beyond. We are facing a crisis as regards the quantity and quality of water supply, but we have yet to experience the full social and political impact of this crisis. The escalation in population and the quest for continued development is leading to conflicting pressures on water resources. Such resources are the ultimate recipient of pollution from various socio-economic activities associated with urbanization, agriculture, mining and clearing of native vegetation. Pollution originating from human waste, especially where appropriate sanitation facilities are

not available, or are located too close to water supply sources affects both surface and ground water.

This makes water supply and health perhaps the most important issue for the larger proportion of the global population. Paradoxically, the demand for 'sustainable management' and increasing global population require more potable water from declining available potable water base.

It is universally accepted that proper water administration is a critical component of sustainable development. Indeed, water is essential in a large number of productive activities, of which one of the most important is the production of food by irrigation. This activity accounts for two thirds of the water resources used by humanity. A supply of drinking water and sanitation in urban centres is crucial for preserving human health.

For some decades it has been known that the misuse of water is responsible for many important environment problems. For example, in many industrialized cities both surface and ground water are seriously contaminated. This deterioration is a consequence of a range of human activities, sometimes in isolation, other over a large area or a long period of time. Among examples of the latter is modern agriculture, whether it uses irrigation or not, as a result of the intensive use made of mineral fertilizers and pesticides.

Some of these problems have made news and have created the impression that water shortage will be one of humanity's big problems in the coming decades. Sometimes this feeling is due to genuinely manipulative publicity campaigns to justify the setting in motion of hydraulic megaprojects which basically benefits a few large construction companies. The truth is that except for a handful of very specific cases, no problems of water shortage are to be found

almost anywhere. On the other hand, cases of bad water management are not rare at all.

Good management of water resources (and of almost all other natural resources) must be based on the principle of solidarity, 'subsidiarity' and participation. The physical reality requires that these resources be considered a common heritage of humanity both now and in the future. By 'subsidiarity' we mean that water management should be as decentralized as possible: what one person or a social group can do should not be done by a higher authority. Participation consists in water users playing as large a part as possible in decisions affecting water, in keeping with each state's or country's social and cultural structure. Obviously this participation calls for a certain cultural and technical knowledge—a hydrological education—on the part of the users.

The need for participation by users is even greater in the exploitation of groundwater. In this case, users tend to extract water independently of one another. They often fail to realize, until there is a serious economic or environmental impact, that their pumping affects other people who rely on the same water supply.

The universal way of obtaining freshwater is from rain. River systems are the results of the excess water that falls on dry land in the form of rain. On the one hand, rainwater penetrates the permeable soils, saturates them and accumulates to form groundwater reservoirs, or aquifers, which can come to the surface in the form of springs. On the other hand, the water is absorbed by vegetation, which uses it for pumping minerals and then evaporates it by transpiration. Some rainwater is lost because it evaporates immediately on falling on impermeable surfaces like the asphalt or roads and cities. Running water courses finally flow over saturated soils, shaping the complex systems of the watersheds or river basins.

Since each basin's natural system has developed gradually and has grown up according to the yearly distribution and fluctuations of rainfall, we have to appreciate that any large-scale project for redistributing water by means of pipes, as if it were gas or electricity, is a journey into the unknown. This is because it destroys the results of the work of shaping the climate, however transitory it might be.

All water supplies are of variable volume. Both the discharge of rivers and the level of lakes and aquifers depend on rainfall. As these resources are components of a larger system, the river basin, a reasonable policy would be to manage water resources according to the characteristics of each basin. This would require, first of all, a proper understanding of the system so as to adapt use and consumption to the existing supply. Conserving river systems as much as possible in their natural state is the best guarantee for the preservation of the landscape and of a constant supply. Groundwater reservoirs are not canals, but are more like lakes, so that pollution leads to the build-up of a debt which is paid in years to come.

CONSUMPTION

Water consumption has increased in recent years as a result of not only population growth but also an increase in living standards. In rural areas the introduction of new farming methods, the spread of irrigation and the excessive use of fertilizers and pesticides causes high consumption. It is estimated that more than 2/3 of water consumption is used in irrigation. Agricultural pollution also endangers both surface water and aquifers, which receive water full of chemical products. Many cases of eutrophication, the enrichment of water by nutrients that accelerate the growth of algae, derive from the run-off of fertilizers. The practice of intensive stock-raising on farms with large numbers of animals also brings about these problems of overconsumption and pollution. Cleaning the stockyards requires large amounts of water which is then released into the environment with high concentrations of nitrogen.

As for industries, they have in the past taken little care over water consumption and dumping, and in many areas the need for proper attention comes as something new. The best thing would be to make industry take its water at a point down-river from where it returns it or, better still, generalize the use of closed circuit systems based on the constant recycling and reusing of the same water.

As regards human consumption, the general attitude to cleanliness is based on diluting

pollutants. One example is the success of the use of the Water Closet which involves diluting a few decilitres of urine in 10 or more litres of drinking water: quite a record in wastefulness.

Another aspect to be considered is the different quality of the water that falls on well formed soils from the water that fall on roads, cities, airports, suburbs and built-up areas and whose composition is less stable and "worse" than that resulting from a more uniform interaction with mature soils. Remember that streets, roofs, communication routes, airports and built-up areas already cover a high proportion of the earth's land area and are still on the increase.

Purification techniques should be based especially on the natural processes that include

biological activity. Otherwise-for example, if physicochemical methods are used-there can be side-effects such as an excess of mud or sediments. The strategy to follow is to optimize operations in our use of water according to the discharge and to the distribution of contamination. A system in the form of a conduit or channel, such as a river, can respond relatively quickly. On the other hand, lakes and dams can only do so up to a point, because they show more inertia and irreversibility and take longer to clean.

Large lakes, not to mention the sea, might seem a good place to dump contaminating refuse, but they can't then be cleaned. This is the price we pass on the future generations: a comfortable attitude, but an unacceptable one.