Water demand and population growth

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Abstract

The contribution of population growth in water demand projections is often obscured, since only the increase in domestic water demand is usually taken as an indication of the increase in water demand due to population growth. This paper aims to quantify direct (domestic) and indirect water requirements (e.g. for food production, energy etc.) to sustain an individual at a particular lifestyle level.

The average domestic water demand projected to the year 2015 accounts for only about 20% of the average full demand while the water demand for the production of food and consumer goods and for employment accounts for 80% of the full water demand to sustain an individual.

The full water demand of the 1995 increase in the South African population of about 1 million people, projected to the year 2015 when the newborns reach adulthood, is conservatively estimated at 638 Ml/d or about 23% of the current average daily water supply of Rand Water, indicating the tremendous pressure on water resources as a direct consequence of the high current levels of population growth.

Introduction

Water demand figures are typically given as the total of the water requirements for the domestic, industrial and agricultural sectors together with estimates on water needs to maintain ecosystems, estuaries, wetlands etc. Projections of future water demands given in this manner often obscure the actual relationship between population growth and water demand increases. The reason for this is that the increase in domestic demand is seen to account for population growth while increases in industrial and agricultural water demand are often regarded as related to economic growth and somewhat divorced from population growth.

The purpose of the study on which this paper is based, is firstly to estimate the "full water demand" for an individual taking into account water needs for domestic purposes, for food, for consumer goods, transport, housing and job-creation. The second objective is to project the full water demand figure for the 1995 increase in the population to the year 2015 when the newborns of 1995 will have reached adulthood. These figures should give a less obscured picture of the effect of population growth on water demand.

Estimates of the indirect water usage e.g. for food production are based on numerous assumptions since the factors which influence water demand may vary over extremely wide ranges and little specific information is available to quantify these variables. The motivation behind the paper is not to try to establish exact figures (this would be impossible) but rather to give a "ballpark" feeling for additional water requirements to sustain an individual at a particular lifestyle level.

Background

South Africa's 1995 population is estimated to be about 43.5 million, growing at an annual rate of 2.3% (Ministry for Welfare and Population Development, 1995). This means that 1995 will show a net increase of about 1 million in our population who will need to be accommodated in the allocation of resources, i.e. creation of 1 million jobs in due course, construction of 500 000 housing units, producing food, and supplying water for the additional people.

The current situation as far as water supply is concerned, is that a large fraction of the population do not have an adequate water supply and/or sanitation facilities of an acceptable level (Department of Water Affairs and Forestry, 1994). Projections of future water demands based on the current situation will not give a realistic picture and projections are therefore made for the year 2015 when the "1995 million" reach adulthood and the imbalances in water supply and sanitation will have been corrected.

General approach

The scope of the study is limited to a desk study comprising the collection and analysis of readily available data.

The approach followed in establishing the full water demand of a person was to develop a water balance for an individual by incorporating the most important facets of life in which water plays a role. In this process a number of assumptions had to be made. These were made in consultation with people knowledgeable in the particular field, and/or from information in the literature. Many of these assumptions are only estimates and open to debate since the many factors which influence water usage vary over extremely wide ranges.

The water balance was made for different levels of lifestyle or consumption in order that different population profiles could be evaluated to arrive at a figure for the predicted water demand for the additional 1 million people.

An important premise of the analysis is that the objectives of the Reconstruction and Development Programme (RDP) would be successful in improving the living conditions of the poor section of society to the level where water and sanitation services of acceptable level would be available to all.

Domestic water demand

Domestic water use comprises a number of components, including drinking, personal hygiene, sanitation, and gardening. Current levels of direct water use vary from 25 l/c.d (the so-called lifeline level) to higher than 400 l/*c.d* for the very high consumption

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