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## Minimum water requirement for social and economic development

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## Abstract

There is no common understanding of the minimum per capita fresh water requirement for human health and economic and social development. Existing estimates vary between 20 and 4,654 l/c/d, however, these estimates are methodologically problematic as they consider only human consumptive and hygiene needs, or they consider economic needs but not the effects of trade. Reconsidering the components of a minimum water requirement estimate for human health and for economic and social development suggests that a country requires a minimum of 135 l/c/d. With all countries except Kuwait having much greater water resources than this, water scarcity alone need not hinder development. Given the steadily decreasing cost of desalination together with the relatively small amount of water required per capita to permit social and economic development, desalination should be affordable where necessary for all but the very least economically developed countries where local naturally occurring freshwater resources are insufficient and saline water is available.

Keywords: Water scarcity; Water requirements; Human development; Economic development; Health; Hygiene

## 1. Introduction

In the Millennium Declaration of the UN General Assembly in 2000 a commitment was made to halve by 2015 the global proportion of people without access to safe drinking water [1]. The international community both confirmed and extended this commitment in the 2002 Johannesburg Declaration on Sustainable Development [2]. The World Health Organisation (WHO) in its Guidelines for Drinking-Water Quality assumes an adult requires approximately two litres of drinking water per day, although it acknowledges that water intake can vary significantly [3]. Improving access to safe drinking water and ultimately achieving universal access to safe drinking water would represent an important achievement. However, ensuring that all people have access to sufficient safe water to meet their drinking requirement alone, will not allow other basic development goals, such as poverty eradication nor the sustainable development of society as a whole, to be met.

Article 25 of the 1948 Universal Declaration of Human Rights states that "[e]veryone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services". While not explicitly stating that there was a human right to water, the human right to water was implied since access to water is a key factor that determines health and well-being. Access to water as an independent human right was recognised in 2002 [4], and as Brooks [5] notes, few people argue against the principle of there being a human right to water for basic households uses even if many countries fail to achieve this in practice. Brooks argues, however, that the concept of a human right to water should be enlarged to include a right to water for household food production and to maintain functioning ecosystems, issues which are returned to later in this paper.

The human need for water clearly goes beyond basic drinking requirements yet despite the perception that global water resources are in crisis, in part due to growing water scarcity, [6], there is no common understanding of what is the minimum amount of fresh water per capita actually required to satisfy human health and economic development, permit poverty eradication, and ideally, enable a high quality of life for all. In part this lack of common understanding is due to disagreement about which components of water usage should be included in such an estimate. This paper thus seeks to answer the question — what components of water usage should be included in an estimate of the minimum amount of water that is required to permit social and economic development in a society? An answer to this question then allows an actual estimate of the minimum amount of water required to permit social and economic development to be calculated.

The magnitude of the minimum water requirement for social and economic development has implications for the role that of desalination in assisting with meeting the Millennium Development Goals relating to basic water provision and poverty reduction. Extremely modest minimum water requirements suggests that desalination already holds significant potential for facilitating these requirements to be met in almost all water scarce regions, including low income countries. A large minimum water requirement for economic and social development, however, suggests that desalination is likely to be too costly to perform this role in low income countries even if it may have a role in water provision for meeting human health and hygiene needs in some low income countries. In such countries the economy would be unable to pay the cost of meeting a large minimum water requirement from desalination.

The magnitude of minimum water requirements for social and economic development also has implications for international negotiations over water resources. The two most authoritative expressions of international water resources law are the Helsinki rules of the International Law Association, published in 1967, and the 1997 Convention on the Law of the Non-navigational Uses of International Watercourses developed by the International Law Commission of the United Nations [7]. According to the Helsinki rules, one of the factors to consider when determining the equitable share of the uses of an international watercourse is the social and economic requirements of each riparian nation [8]. The 1997 Convention similarly list the socio-economic needs of the watercourse nations as one of the factors to be considered when determining the equitable use of an international watercourse [9]. The 1997 Convention also states that riparian countries must refrain from causing "significant harm" to the other riparian countries of an international watercourse; denying a country sufficient water to permit social and economic development could be considered as causing significant harm to that

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