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MEASURING THE LIMITS: WATER SCARCITY INDICATORS AND THEIR DISCONTENTS

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Abstract

Few ideas have shaped water policy as powerfully as the claim that the world is running short of water, and few have been measured as crudely. This paper examines the indicators by which water scarcity is judged and asks how well they serve the purposes to which they are put. It argues that the dominant volumetric indicators, which compare the water available in a country or basin to the number of people who must share it, offer a useful first approximation but mislead when taken as more than that, because they average over the variability, the quality, and the access that in practice determine whether people have the water they need. Drawing on the critical assessment of scarcity measurement, the paper distinguishes physical scarcity, where the resource itself is insufficient, from economic scarcity, where water exists but the means to capture and deliver it do not, and shows that the two call for quite different responses. It concludes that scarcity is better understood as a relationship between water, people, and institutions than as a ratio, and that indicators which ignore this relationship risk directing effort toward the wrong problem.

Keywords: *water scarcity; indicators; physical scarcity; economic scarcity; water availability*

1. Introduction

The proposition that the world faces a water crisis has become a commonplace of policy, and like many commonplaces it rests on a number. That number is usually an indicator of water scarcity, a figure meant to capture, in a single quantity, how close a society stands to the limits of its water. Such indicators are indispensable, for without some measure the crisis cannot be spoken of at all; but they are also treacherous, because a measure that is convenient to compute is not necessarily a measure of the thing that matters. This paper asks what the standard scarcity indicators actually measure, where they serve well, and where they mislead, and argues for an understanding of scarcity that the usual numbers cannot supply.

The discussion first describes the volumetric indicators that dominate the field, then sets out the critique that distinguishes physical from economic scarcity, then considers what the indicators

omit, and finally argues for a relational understanding of scarcity. It is a conceptual examination of a measurement practice rather than a presentation of new data.

2. The volumetric indicator and its appeal

The most widely used scarcity indicators are volumetric: they divide the renewable water available in a territory by its population, and compare the result to thresholds below which the territory is deemed water-stressed or water-scarce. The appeal of such a measure is obvious. It is simple to compute from data that are widely available, it yields a single comparable number for every country, and it expresses an intuitively compelling idea, that scarcity is a matter of too little water for too many people. On this basis, global assessments have concluded that a large and growing share of the world's population lives under water stress, a share driven upward by the twin pressures of population growth and climatic change (Vorosmarty et al., 2000). As a way of raising the alarm and ranking the broad exposure of nations, the volumetric indicator has served a real purpose.

3. Physical and economic scarcity

Yet the critical reassessment of scarcity measurement has shown that the single volumetric number conceals a crucial distinction. Water may be scarce in two quite different senses. In the first, physical scarcity, the resource itself is insufficient: there is simply not enough water in the basin to meet the demands placed upon it, even if every drop were efficiently captured and used. In the second, economic scarcity, water is physically present in adequate quantity, but the financial, institutional, and human means to capture, store, and deliver it are lacking, so that people go short amid relative abundance (Rijsberman, 2006). The distinction matters because the two forms of scarcity call for opposite responses: physical scarcity demands that demand be curbed and allocation be managed among competing uses, whereas economic scarcity demands that the capacity to mobilise existing water be built. A volumetric indicator that lumps the two together cannot tell a society which problem it has, and therefore cannot guide it toward the right solution (Rijsberman, 2006).

4. What the indicators omit

Beyond conflating the kinds of scarcity, the volumetric indicators omit several things that determine whether people in fact have the water they need. They omit variability: a country whose annual average suggests abundance may suffer acute seasonal or interannual shortage, because water that arrives in a brief monsoon flood is not available in the long dry season unless it can be stored. They omit quality: water that is present but polluted is not usable, so that a society may be scarce in effect while abundant on paper. And they omit access and distribution: a national or basin average says nothing about whether the water reaches the poor, the remote, or the politically weak, who may go short while others have plenty. Each of these omissions means that the indicator measures the availability of water in the aggregate rather than the security of its supply to people, and it is the latter that the concept of scarcity is ultimately meant to capture (Grey & Sadoff, 2007; Rijsberman, 2006). An indicator blind to variability, quality, and access can therefore paint a reassuring picture of a society that is in real difficulty, or an alarming picture of one that is coping well.

5. Scarcity as a relationship

These limitations point toward a different understanding. Scarcity is not a property of the resource alone, to be read off a ratio of water to people, but a relationship among the water, the people who need it, and the institutions and infrastructure that stand between the two. Whether a given quantity of water is scarce depends on how variable its supply is and whether it can be stored, on whether its quality fits its intended use, on whether the means exist to deliver it where and when it is needed, and on how its access is distributed among a society's members. Understood this way, scarcity becomes a question of the security of supply under real conditions rather than of a bare volume, which aligns it with the broader concern for reliable, usable water and controlled water-related risk (Grey & Sadoff, 2007). This relational view does not make indicators useless, but it changes what they must measure: not water per head, but the reliability and reach of usable water, which is a harder thing to capture and a more honest one to seek.

6. Conclusion

The indicators by which water scarcity is judged have done valuable service in raising the alarm and ranking exposure, but they mislead when their convenience is mistaken for accuracy. By averaging over the distinction between physical and economic scarcity, and by omitting the variability, the quality, and the access that determine whether people actually have water, the volumetric measures can direct effort toward the wrong problem, prescribing demand restraint where the need is for capacity, or complacency where the need is for action. A more faithful understanding treats scarcity as a relationship between water, people, and institutions, and asks not how much water there is per head but whether usable water reliably reaches those who need it. Measuring that is harder, but it is the measurement that water policy actually requires.

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