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## Objectives

By the end of this chapter you should be able to:

1. Understand that hazardous environmental conditions are more often present and more dangerous in the places where the poorest live, work or visit;
2. Appreciate that those who suffer from environmentally determined disease, the poorest are most likely to suffer illness and death as a result; in other words, the poor die young.
3. Be aware that given the same intensity of environmental exposure, the poorest run the greatest risks of poor health as a result.

## Introduction

According to Amartya Sen, awarded the Nobel Prize in Economics in 1998, “poverty must be seen as the deprivation of basic capabilities rather than merely the lowness of incomes” (Sen 1999). Sen sees every individual as endowed with certain capacities, and the inability to realise them fully represents a state of “un-freedom” which prevents the individuals from overcoming their poverty. A consequence of this definition is that poverty is no longer solely perceived as an attribute of the individual, but rather becomes a population level factor of the society in which it is found, and which necessitates an economic social, political and cultural environment such that poverty is eliminated. In other words, the “poor” does not refer simply to those who failed to take advantage of opportunities, but to an outcome which is the result of a society which provided an insufficient set of opportunities to fully develop the livelihoods of all its citizens.

The production or attenuation of poverty is related to the adoption of specific economic or social policies which interfere in the way in which people get access to goods and services. There are many examples of how socio-political measures have led to an increase in poverty, from the monetarist fiscal policies in the early years of Mrs Thatcher's Britain, to the transition of the Eastern European countries after 1989, when observers noted, "dramatic declines in income, the reappearance of diseases long forgotten, growing poverty and great uncertainty." (Milanovic, 1998). Even in times of rapid economic growth and in spite of increases in income level, poverty can grow with increasing income inequality, as observed by Mújica, Vázquez et al. (2014) in four of the BRICS countries between 1990 and 2010 - the Russian Federation, India, China and South Africa and with the exception of Brazil.

On the other hand, poverty affects the relationship between water and health in ways which are determined by various factors, particularly the characteristics of the community. Factors such as ethnicity (see UNDP 2006) and migration are closely involved, not least because the poorest people are often heavily represented among migrants and among particular ethnic groups. Educational level has an ambiguous role in this area; poor children usually reach only the lowest levels of attainment. As a result, they learn least about diseases, and least about the hygiene measures to prevent them. Gender also (Saleth, Samad et al. 2003) is a mediating factor, in the sense that among the poor, women are often the most vulnerable.

The poverty of a society, or of groups in that society is a fundamental mediating (or facilitating) factor affecting the outcome of environmental conditions on human health. Three premises – which are linked to the learning objectives of the chapter - support that statement, and will be explored in this chapter:

1. Hazardous environmental conditions are more often present and more dangerous in the places where the poorest live, work or visit;
2. Among those who suffer from environmentally determined disease, the poorest are most likely to suffer illness and death as a result; in other words, the poor die young.
3. Given the same intensity of environmental exposure, the poorest run the greatest risks of poor health as a result.

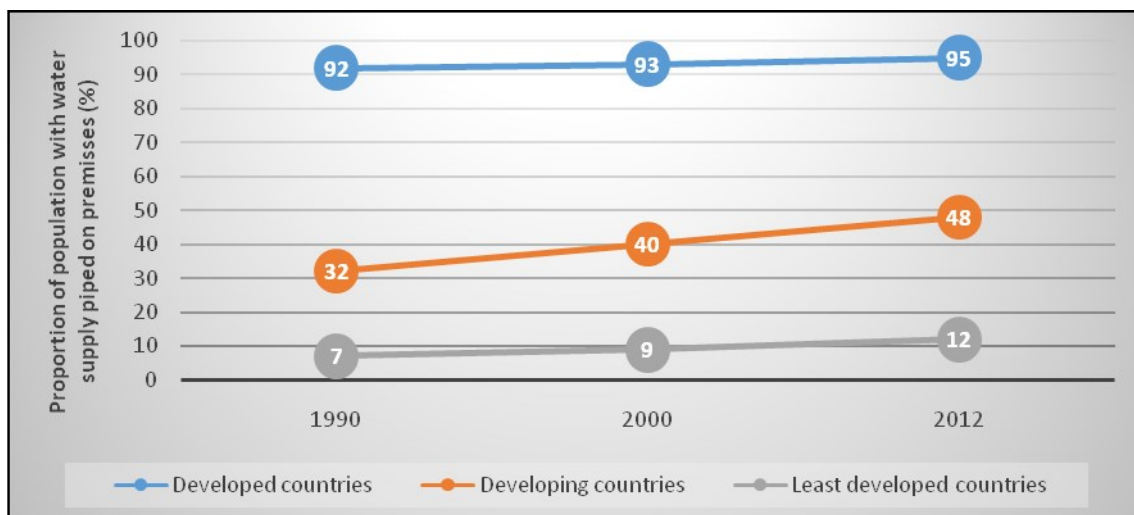
## **The poor are most affected by environmental hazards or change**

An extensive literature considers how environmental impacts do not affect everyone uniformly. Martinez-Allier (2002) used the phrase, "the environmentalism of the poor", to express a political position regarding the interpretation on how the environment affects the global poor. The author sets this perspective against the two prevailing rationales: the "cult of wilderness" - representing the defence of an immaculate Nature - and the "gospel of eco-efficiency" – which focuses on the modernization of the economy and the compatibility between economic growth and acceptable environmental

and health impacts. The “environmentalism of the poor” blames economic development for producing increased environmental impacts, with geographical displacements from North to South, of “sources and sinks.” This position is perfectly compatible with the tenets of environmental justice, which holds that the worldwide burden of environmentally-caused disease is disproportionately present in poor people and that, globally, much of the environmental damage is caused by the richer countries (Schlosberg 2007; Stephens 2007). Moreover it can be argued that poverty, especially urban or peri-urban poverty, is not a significant contributor to environmental degradation, but that on the contrary, urban environmental hazards are major contributors to urban poverty. It accordingly follows that well-conceived environmental policies could be important instruments to propel poverty reduction forward (Satterthwaite 2003).

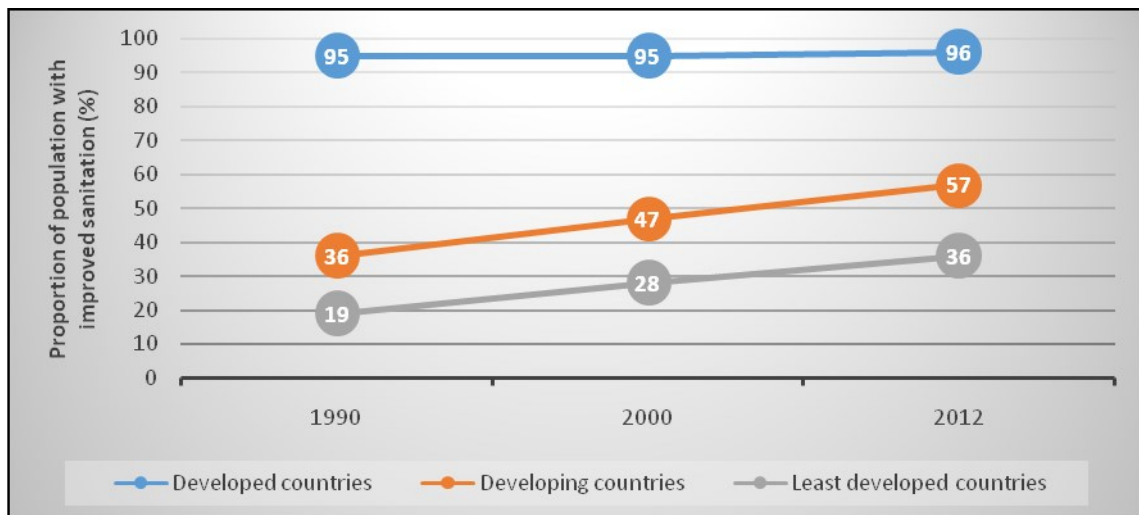
Applying the concept of environmental justice to water issues would require water to be regarded simultaneously as a natural or material and social good, as well as an explicit acceptance of water problems as increasingly being contested. Water justice includes, but transcends, questions of the distribution of services by including both cultural recognition and political participation (Zwarteveen and Boelens 2014). In addition, the institutional arrangements we employ for governing water must address issues of democratization, human welfare and ecological conditions (Perreault 2014). The concept of access to water resources and water services is thus broadened, as Sen (1982) did for access to food by introducing the concept of entitlement.

Specifically regarding access to water services, the disparity between the developed and the developing countries is very clear, as shown in Figures 1 and 2.



Source: Elaborated by the authors on data from WHO / UNICEF Joint Monitoring Programme (2014)

**Figure 1. Proportion of population with access to water supply piped on premises. Developed, developing and least developed countries (1990, 2000, 2012)**



Source: Elaborated by the authors on data from WHO / UNICEF Joint Monitoring Programme (2014)

**Figure 2. Proportion of population with improved sanitation. Developed, developing and least developed countries (1990, 2000, 2012)**

There are various reasons for the striking differences in the proportion of the population with access to these services. They range from a history of inadequate and irregular investment in the sector to shortcomings in public policy in the poorer countries, which fail to provide for their populations a planned expansion of access to facilities and the means for their sustainable use thereafter.

### “The poor die young”

This was the title of a book published more than two decades ago (Hardoy, Cairncross et al. 1990), which brought together evidence of much higher levels of ill-health and premature death in the poorest urban populations in developing countries, compared with the better-off residents in the same cities. The book analysed housing and living conditions, including relations with water supply, sanitation and urban drainage, as the principal explanatory factors accounting for these differences. This finding was supported by the analysis of a World Bank economist (Listorti 1996), also considering the urban environment, who concluded that most environmental health problems are man-made and therefore preventable. He calculated that infrastructure improvements, by improving urban environmental health, could prevent up to 44% of the burden of the disease in the cities of the developing world. This can be compared with the World Bank estimate (World Bank 1993) that basic health services could prevent only 32% of the disease burden, and at greater cost to the economy.

The social determinants of human health have received increasing international attention, particularly since 2004 when the WHO established the Commission on Social Determinants of Health, with a view to promoting policies to reduce inequalities in health within and between countries. At the launch of the Commission it was suggested

that, “The gross inequalities in health that we see within and between countries present a challenge to the world. That there should be a spread of life expectancy of 48 years among countries and 20 years or more within countries is not inevitable.” It was also noted that mortality of children under 5 varied from 316 to 3 per 1000 live births among countries (Marmot 2005).

The study of the social determinants of health has for several decades been the concern of the discipline known as Social Epidemiology, the early development of which was strongly rooted both in Latin America, where it was known as Critical Epidemiology (Breilh 2008), and also in the North (Berkman and Kawashi 2000; Galea and Link 2013). The different schools of thought considered social factors “in the causal chain of factors that lead to the production of health” (Galea and Link 2013), or else adopted a radically different explanatory model of the health-disease process in which social exclusion by capitalist society plays a key role (Breilh 1991). In different ways, these theoretical streams start from social factors at the individual, collective or macro level, to explain the process of health and disease and health inequalities.

The controlled effect of income inequality on health has been demonstrated in quantitative studies and in meta-studies, such as the meta-analysis developed by Kondo, Sembajwe et al. (2009), showing that each increase of 0.05 in a country’s Gini coefficient (a measure of income inequality), is associated with an increase in the odds of dying by a factor of 1.08 (95% CI; 1.06 to 1.10) for cohort studies, 1.04 (95% CI; 1.02 to 1.06) in cross sectional studies, and stronger associations in studies conducted on countries with a Gini coefficient higher than 0.3. In other words, social equality is good for all our health, benefiting society as a whole and not only the poor.

### **In the same environmental conditions, the poorest run the greatest health risks**

“The Bangladeshi who is drinking water with 50 micrograms per litre of arsenic and has poor nutrition may have worse health than a well-nourished person drinking the same water.” (BWHO 2008). This statement, from a Bangladeshi researcher commenting on the tragic contamination of many groundwater sources in that country with naturally-occurring arsenic, illustrates the premise of this section. Not only are the poorest frequently subjected to the most hazardous environmental health conditions; even if they are in the *same* environmental health conditions, there are various features of their poverty which amplify the health risks to which their environment exposes them. Specifically in the case of Bangladesh, the asymmetry of the burden occurs even though the tubewells were installed as an environmental health improvement. These asymmetric outcomes can be explained by various factors: individual factors (nutrition, immunity, interaction with other diseases,...), collective factors (the insanitary living environment) and social factors (access to health care services, presence of social capital).

Thus, poverty exposes to a greater risk of disease groups who are already vulnerable because of other factors: their age (children and the elderly); gender; demography

(families in crowded, unhygienic conditions); occupation (relative to certain high-risk occupations); socioeconomic (the poorest of the poor); as well as their environment, their access to health care, among others.

## **Poverty, environment and health: how the links connect**

The three premises above help us to understand **why** poverty is a fundamental potentiating factor to the links between environment and health. Because of this relationship, several processes can arise, explaining **how** environmental exposures are particularly important to the poor.

Poor people live where environmental health conditions are worst. This is no accident. Poor people cannot afford to live on spacious, well-drained land away from busy roads and with access to clean air, good water supply and sanitation, and effective solid waste management. Those who can afford to pay for sufficient environmental services generally do so. The poor cannot afford these, and so live with the consequences of a dirty and unhealthy environment.

The poor cannot afford good housing. Besides, it would not be sensible for them to invest their scant resources in housing improvements when they are squatters, and so liable to eviction, or damage by flooding, fire or landslides. That means that poor communities do not have pumps, like their wealthier counterparts, to provide water from a piped system when the pressure is low. Millions do not even have their own toilet. So they suffer more from diarrhoea, intestinal worms and other diseases associated with poor hygiene.

The burden of environmental disease falls more harshly on the poor. The poor are vulnerable not only because of where they live, but also the work they do, the greater risks they run, and lower resistance to infection. In poor families, it is not only those who are ill who suffer; the others have to make sacrifices to care for them or to work in their place, especially if it is the breadwinner or the provider of child care who is ill or injured. When poor adults die, their children often die soon afterwards (Over, Ellis et al. 1992).

The poor already pay more for environmental health services. In low-income urban areas, many people buy their water from vendors, who sell it for 10 to 20 times more than the water tariff charged by the formal water utility to people who can afford house connections. Other costly items are mosquito control, latrine emptying and rubbish collection when purchased from the informal sector. These items can amount to over 20% of a poor household's income (Zaroff and Okun 1984; Cairncross and Kinnear 1992), and the money for them comes out of the food budget; according to Engel's law (Engel 1857) there is nowhere else it could come from. Affordable environmental health services therefore enable people to both live and eat better! (M'Gonigle and Kirby 1936).

Disease contributes to poverty. When poor people fall ill, they lose income and often lose their jobs. When the illness is serious or affects the breadwinner, desperate relatives spend their savings on treatment, often on inappropriate cures prescribed by charlatans. Impoverished families can often trace the origin of their predicament to the cost of a

health disaster affecting one of their members (Xu, Evans et al. 2003). Environmentally-caused disease affects their prospects in other ways, too; children with intestinal worms or exposed to environmental lead may be stunted in their growth or handicapped in their intellectual performance (Nokes, Grantham-McGregor et al. 1992; Walker, Wachs et al. 2011).

Environmental health is about more than health. In a number of studies, “environmental health interventions” (improved water supply, drainage, sanitation, roads) rank highly among the poor as signs of progress, as ways of knowing that life has improved. But for the poor, health is only a side benefit of these improvements. The main benefits are often about:

- Saving precious time
- Reducing the burdens of daily life
- Lowering the basic cost of living
- Emancipation of women
- Increasing dignity, self-respect, and safety
- Creating a more pleasant and ordered living space
- Increasing income through service provision and sound resource management (recycling rubbish, building latrines, etc.)

These are not “Wrong” reasons to want environmental health improvements; rather, they are additional benefits. Moreover, they mean that people are often willing to pay for the services (Bartram and Cairncross 2010).

## Implications of poverty for the link between water and health

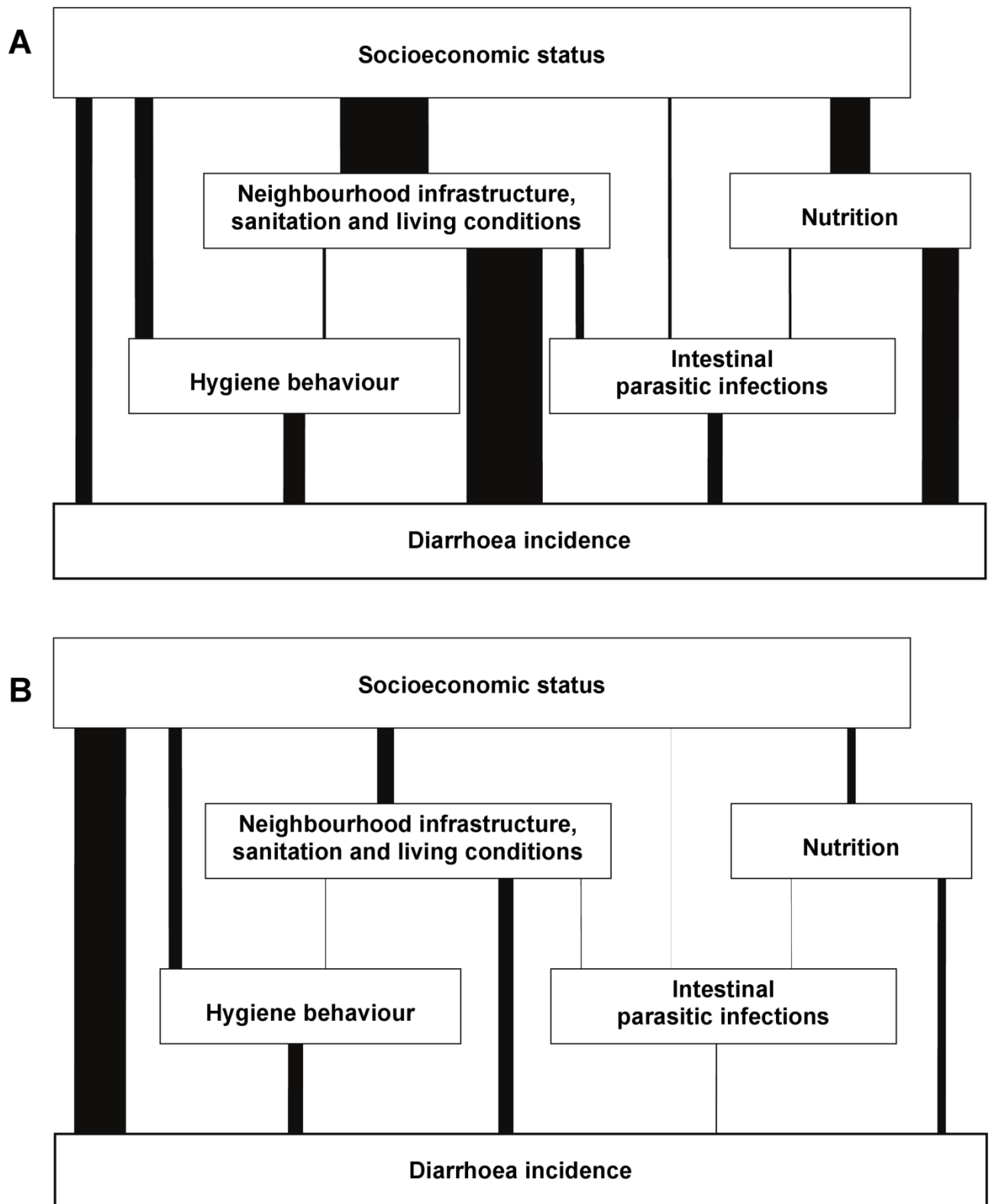
### *Implications for research & evaluation*

Studies of the relation of water and public health often fail to identify the mediating role in the relationship played by the condition of poverty. Poverty is frequently treated simply as a confounder in epidemiological studies, which effectively reduces the dimensions of this complex factor to only one. One of the limitations often encountered is the difficulty of characterising the state of poverty, as the variables commonly used to “measure” poverty are inaccurate and unreliable. Some of the indicators, such as the *ownership of goods*, may show the amount of goods accumulated by the patriarch of the extended family at a particular stage in the household development cycle, without accurately measuring the current productive capacity of other individuals and families. Other variables, such as *wages*, can be unreliable where poor people are concerned as they often do not have a steady job or a constant monthly wage.

Studies of poverty at the collective level such as those which compare countries can easily fail to map the full extent of poverty in its various forms, leading to underestimates of the magnitude of the problem, even in the apparently objective statistics collected and published by international initiatives like the WHO/UNICEF Joint Monitoring Programme (Satterthwaite 2014). One of us (SC) organised the reform of that monitoring programme in 2000, so we state this advisedly.

Thus any scientific study of the links between poverty, water and health needs to take special care to avoid a number of pitfalls. First, the condition of poverty needs to be considered at various levels of aggregation, from the individual to the nation, whether or not the study is epidemiological. Second, the mediating role of poverty in the relationship between water and health deserves careful study, bearing in mind that these relations are not necessarily linear. Limited access to water produces poverty, just as poverty explains limited access; poor health produces poverty, just as poverty explains poor health. There are many settings in which poverty is more than a confounding variable, and may even be a determinant, or a driving force of ill health, and needs to be considered as such. Fig 3 shows an example of how environmental improvements can weaken this link between poverty and ill-health. In the Figure, the width of each vertical bar shows the proportion of diarrhoea risk attributable to socio-economic status and mediated by the intermediate variables shown. The two figures show conditions respectively (a) before and (b) after implementation of a major sanitation project. The project was associated with a 21% reduction in diarrhoea citywide, and 42% in the high incidence areas. Socio-economic status accounted for 23% of the variance in diarrhoea rates before the project, but afterwards the strength of that link (corresponding to the total thickness of all four bars near the top of the figure) had been halved, to 11%. The proportion of that association mediated by intermediate variables, particularly sanitation, was also greatly diminished.





Source: Bartram and Cairncross (2010)

**Figure 3. Determinants of diarrhoea in Salvador, Brazil, 1997 - 2004; results of a hierarchical effect decomposition analysis.**

(A: before and B: after implementation of a major sanitation project)

### *Implications for policy*

Clearly, the issues discussed in this chapter have public policy implications. On one hand, adequate integrated water management can contribute to poverty reduction along the four dimensions adopted in the poverty reduction framework of the Poverty-Environment Partnership (PEP 2006):

- Enhanced livelihoods security, assured by the provision of improved water services and the consequent opportunities for livelihoods improvement, with greater security and sustainability.
- Reduced health risks, through the mitigation of factors related to water management that put the poor and most vulnerable at risk from various diseases, poor nutrition and untimely death.
- Reduced vulnerability, by means of the reduction of threats from water hazards, such as floods, droughts and major storms; the rise in sea levels due to climate change; and the impact of water pollution, including saline intrusion.
- Pro-poor economic growth, facilitated by the improved management of water resources, especially where changes in water management are part of a wider development strategy aiming to create opportunities for poor people.

On the other hand, there is a debate, among those concerned with public policy for poverty elimination between universalist approaches – in which the entire population is the beneficiary of social benefits - and targeting - through the identification of groups to be benefited, based on eligibility criteria (Fischer 2010; Mkandawire 2005), with the balance of opinion favouring universalist policies as a means of poverty reduction. However, there is evidence that at least in some cases, targeting can offer sound health impacts to the beneficiaries (Rasella, Aquino et al. 2013). Once it is accepted that poverty can reduce the health benefits which accrue to populations enjoying improved access to water and of initiatives toward integrated water resources management, this can have important policy implications. For public policies in the water sector to realise their full potential benefit to health, they should preferably be linked to wider social programmes, whether universalist or targeted, which are designed to alleviate poverty.

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Please select only 3 recommended readings

## **Key Recommended Readings**

Berkman LF, Kawashi I (ed) (2000) *Social Epidemiology*. Oxford University Press, Oxford: is an advanced reading, containing 16 chapters on the social determinants of health, through different perspectives, as socioeconomic position, income inequality, and social capital.

Hardoy JE, Mitlin D, Satterthwaite D (2001) *Environmental problems in an urbanizing world*. Earthscan Publications Ltd., London emphasizes the environmental hazards in the cities, including the lack of water and sanitation, and how the urbanizing process affects the environment.

Martinez-Allier J (2002) *The environmentalism of the poor: a study on ecological conflicts and valuation*. Edward Elgar Publishing Limited, Cheltenham, Northampton is a reference book for the social movements of environmental justice, bridging the fields of political ecology and ecological economics to explain how and why environmental burdens fall disproportionately on the poor.