

## Economics of Sanitation Initiative

# NICARAGUA

## The Cost of Inadequate Sanitation



**Economics of Sanitation Initiative  
Nicaragua: The Cost of Inadequate Sanitation**

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U.S. Department of Defense, Humanitarian and Civic Assistance Mission in Nicaragua. Danielle Grannan, U.S. Air Force

Nicaragua Water Crisis. ONE DROP Foundation. [www.onedrop.org](http://www.onedrop.org)

Toilet Instalation. Adan Horacio Blanco Hernandez

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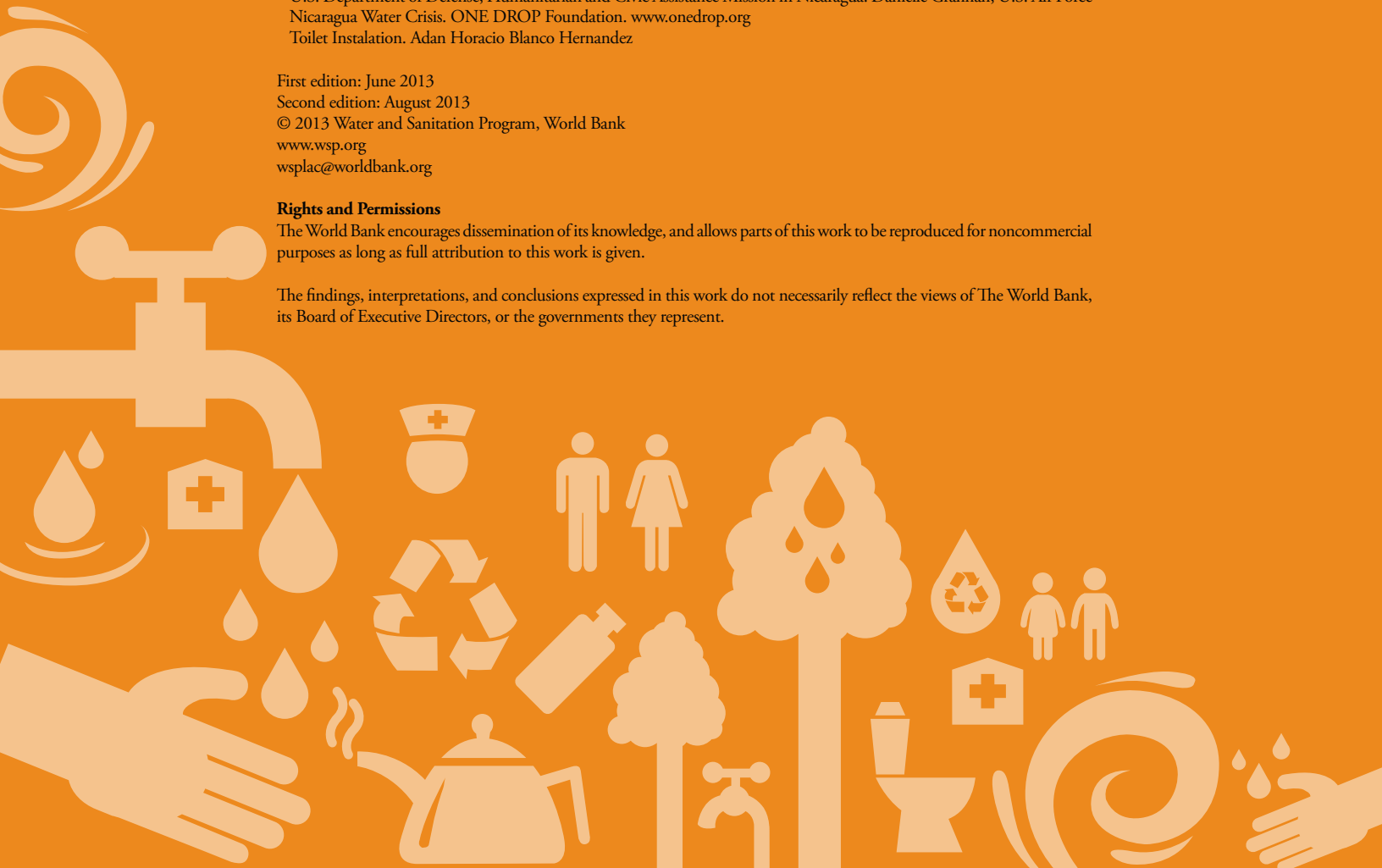
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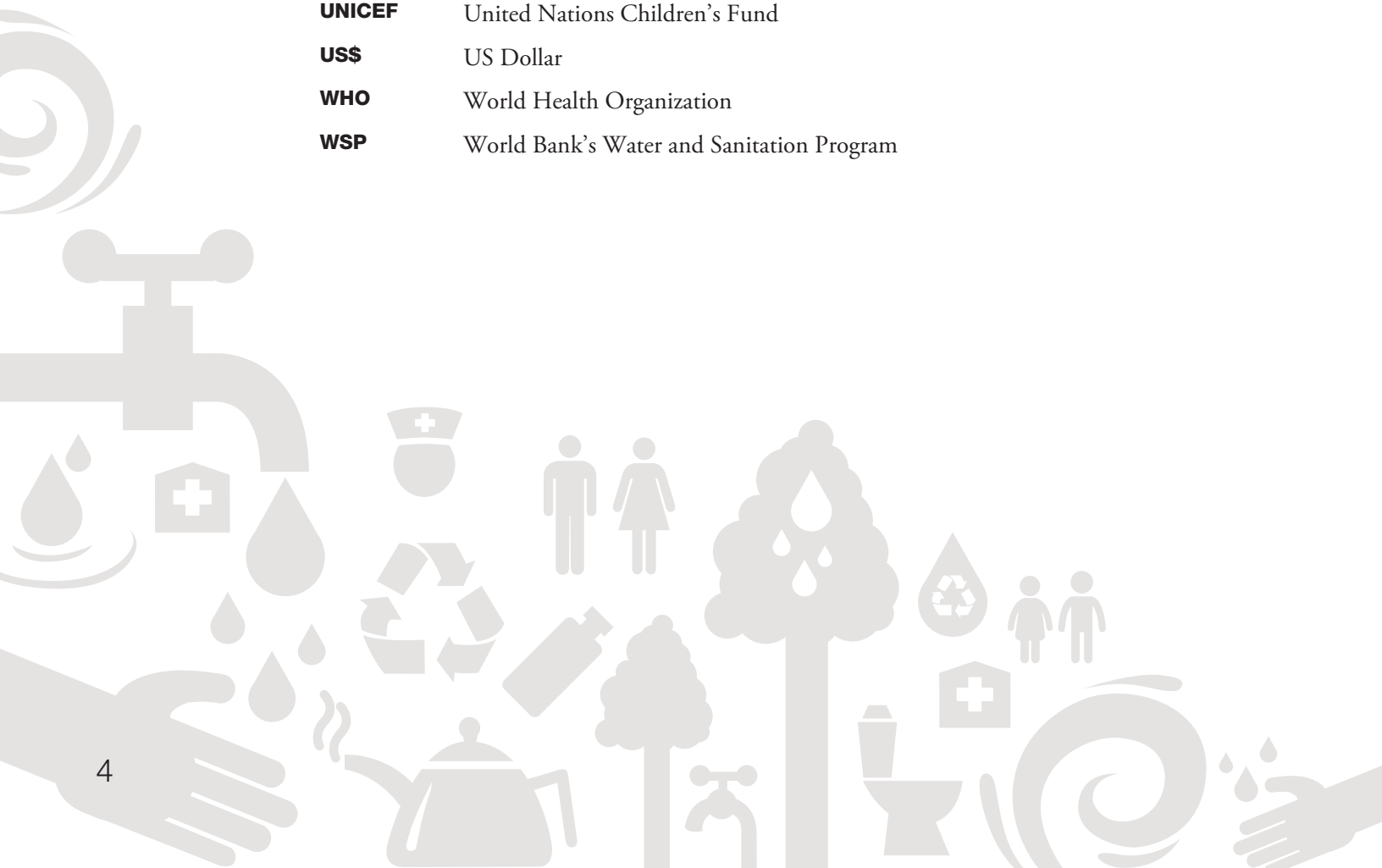
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# Abbreviations

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<b>BCN</b>	Central Bank of Nicaragua (Banco Central de Nicaragua)
<b>C\$</b>	Cordoba (Nicaraguan currency)
<b>ENACAL</b>	Nicaraguan Company of Aqueducts and Sewers (Empresa Nicaragüense de Acueductos y Alcantarillados)
<b>ESI</b>	Economics of Sanitation Initiative
<b>GDP</b>	Gross domestic product
<b>ID</b>	International Dollar
<b>INIDE</b>	National Institute of Development Information (Instituto Nacional de Información de Desarrollo)
<b>MDGs</b>	Millennium Development Goals
<b>PPP</b>	Purchasing power parity
<b>UNICEF</b>	United Nations Children's Fund
<b>US\$</b>	US Dollar
<b>WHO</b>	World Health Organization
<b>WSP</b>	World Bank's Water and Sanitation Program



# Contents

<b>1. Introduction</b>	<b>6</b>	Impacts on water resources	<b>13</b>
Country basic figures	<b>8</b>	Impacts on tourism	<b>14</b>
Background	<b>9</b>	Other impacts non-assessed on welfare	<b>16</b>
<b>2. Results: Economic impacts of inadequate sanitation</b>	<b>10</b>	<b>3. Conclusions</b>	<b>18</b>
Impacts on health	<b>12</b>	<b>4. Recommendations</b>	<b>21</b>

# 1. Introduction

This report analyzes the economic and social impacts derived from the lack of sanitation in Nicaragua. The study on which it is based has been promoted by the Economics of Sanitation Initiative (ESI), led by the Water and Sanitation Program of the World Bank (WSP).

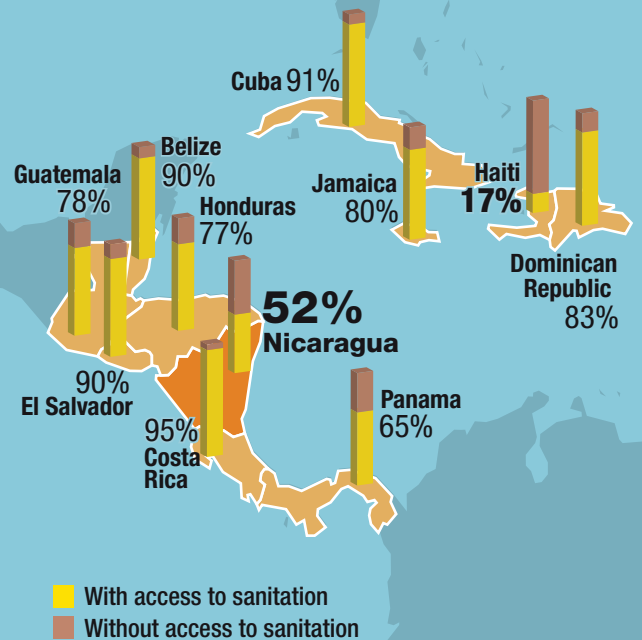
The study used national data and surveys, other small-scale research studies and experts consultations.

It includes basic information on Nicaragua, records of sanitation in the country and the results of the analysis of the economic impacts on health, water resources, tourism, and other impacts on welfare.

The results are of special interest for Government authorities, experts on issues of sanitation, civil society organizations, and international cooperation agencies.

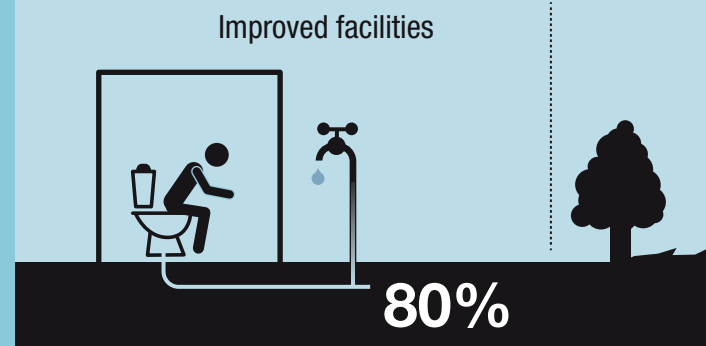
## Central America

### Population with access to improved sanitation



Source: Progress in water and sanitation (Update report 2012), Joint WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation

### ACCESS TO



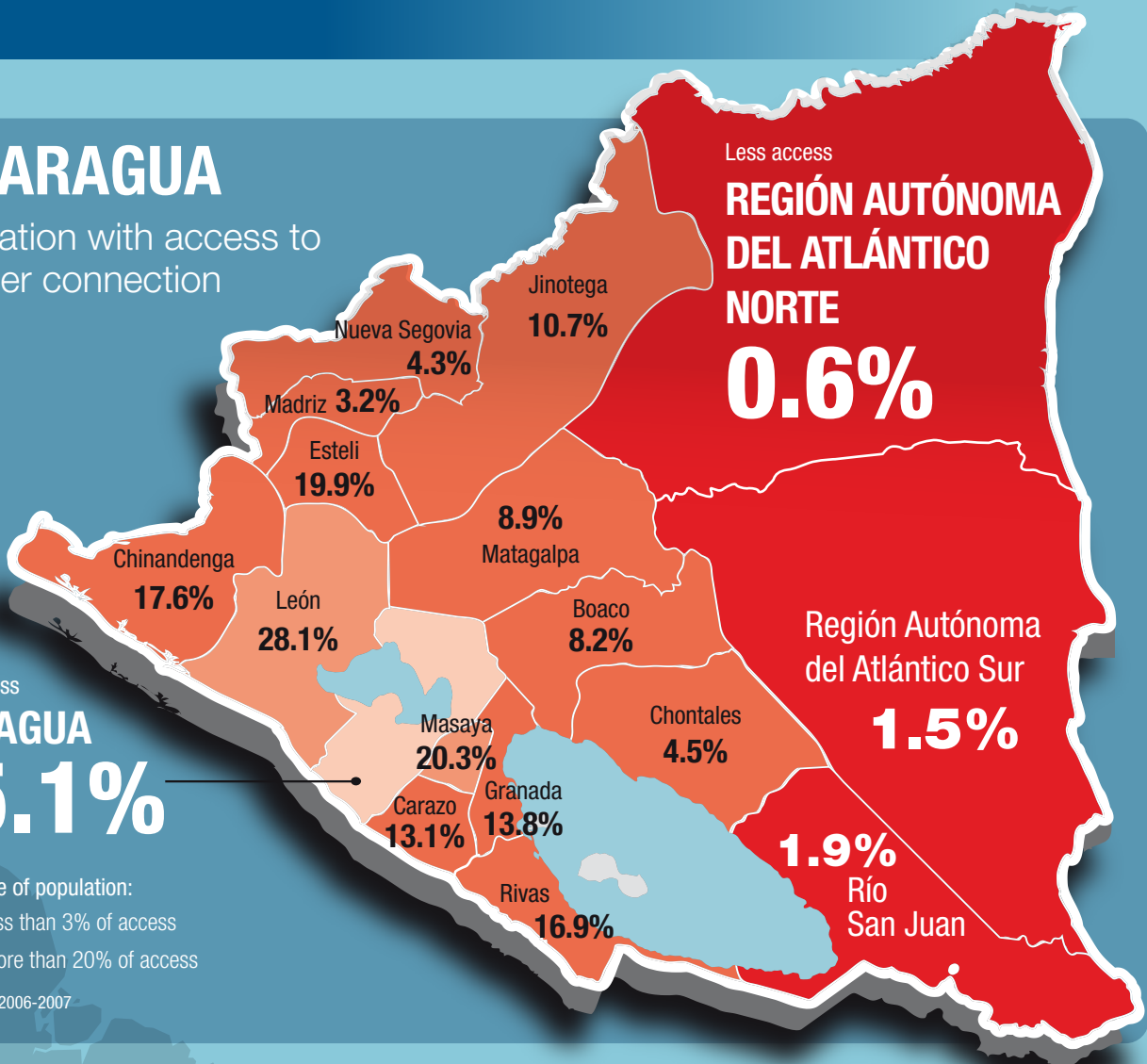
# NICARAGUA

Population with access to a sewer connection

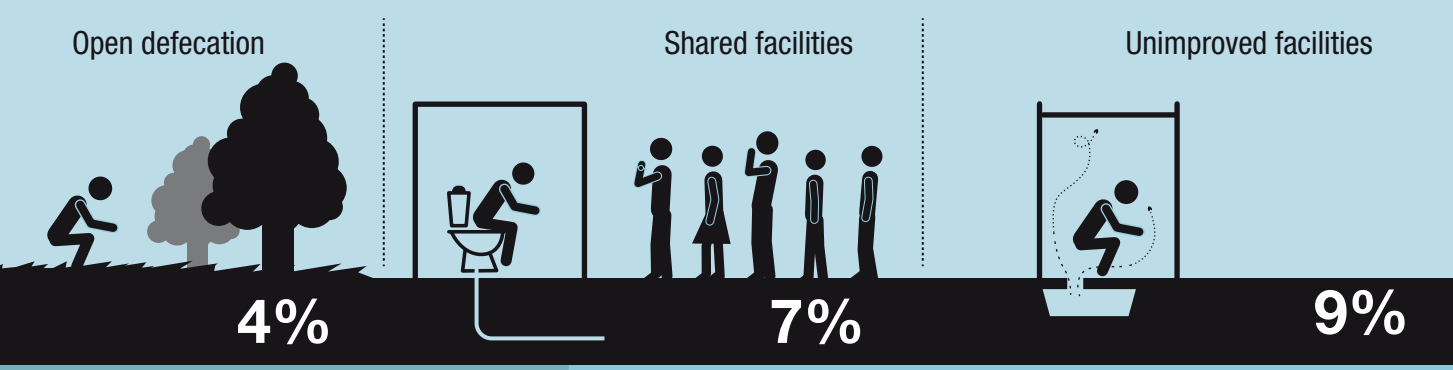
More access  
**MANAGUA**  
**55.1%**

Percentage of population:  
● With less than 3% of access  
● With more than 20% of access

Source: INIDE 2006-2007



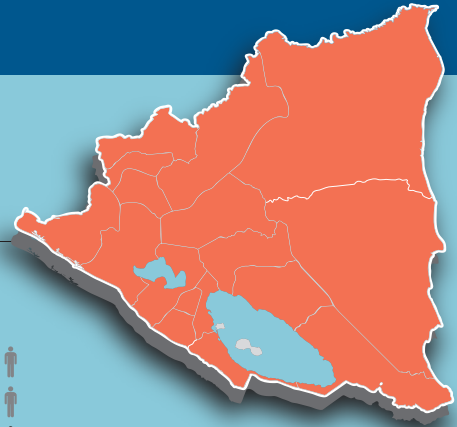
## SANITATION IN LATIN AMERICA AND THE CARIBBEAN



Source: Progress in water and sanitation, WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation 2012.


# Country basic figures

 Total population\*  
**5,74** million inhabitants



Total percentage of rural and urban population\*

 Rural population **41,7%**

 Urban population **58,3%**



Annual growth of the population (2009)\*



**1,3%**

Population under 5 years of age (2009)\*



**11,8%**

Mortality rate in children under 5 (2009)\*  
 (per 1,000 births)



**25,6**

Female population\* (2009)



**50,5%**

Population living in poverty (US\$ international)<sup>1</sup>

Daily income under US\$ 2\*



**31,9%**

Daily income under US\$ 1,25\*



**15,8%**

1 Purchase power adjusted to US dollars. The ID (international dollar) is a hypothetical monetary currency used to translate and compare costs between two countries, using the American dollar as a reference. It is calculated using the purchase power parity (PPP), in other words, the amount of local monetary units needed to purchase, within the country, the same number of goods that could be purchased in the US with USD1,00.

2 It doesn't include homes with sanitation facilities shared with other homes.

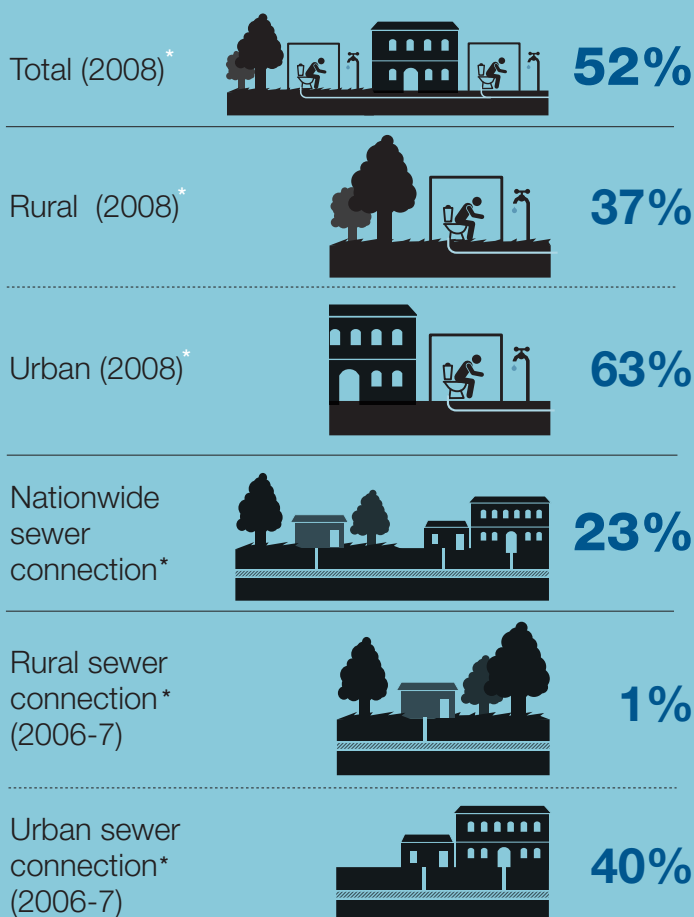


## Background

### Economy

Currency	<b>Cordoba (C\$)</b>
Exchange rate C\$ to US\$*	<b>US\$ 20,34</b>
GDP per capita (US\$)*	<b>US\$ 1070</b>
GDP per capita (international US\$) <sup>1*</sup>	<b>US\$ 2660</b>

### Improved sanitation



SOURCES:

- \* Nicaraguan Central Bank (2010)
- \* World Health Organization / UNICEF (2010)
- \* World Bank (2010)
- \* National Institute of Development Information (2008)

Nicaragua has a total coverage of 52% of the population with improved sanitation — which is below the average of other countries in Latin America and the Caribbean<sup>1</sup>.

Even when the coverage between 1990 and 2008 increased from 43% to 52%<sup>2</sup> (which shows a significant progress), it is still insufficient to fulfill the 72% that Nicaragua set out as a goal for 2015<sup>3</sup>.

The efforts to raise the sanitation coverage have to compete with the demographic growth<sup>4</sup>, which shows that every year some 80 thousand Nicaraguans need improved sanitation infrastructure, a number that adds up to the 2,75 million citizens which still lack those facilities.

Likewise, there are still great differences between the access to improved sanitation systems of the urban and rural sectors. The percentage of the population without access to sanitary services surpasses 20%<sup>5</sup> in the five departments with the highest poverty rates in 2005. In contrast, “only” 2% of the population in Managua lacks access to sanitary facilities.

- 1 “Progress in water and sanitation: Update Report 2010” WHO/UNICEF, 2010.
- 2 The reported figures do not include homes with sanitation infrastructure shared with other homes, according to the definition of the “WHO / UNICEF Joint Program for Monitoring the Supply of Water and Sanitation” regarding improved sanitation.
- 3 Within the Millennium Development Goals (MDGs).
- 4 Estimates starting in 2008, World Bank 2010.
- 5 National Institute of Development Information.

## 2. Results

### Economic impacts derived from inadequate sanitation (2009)

Lack of sanitation and hygiene causes negative effects on:

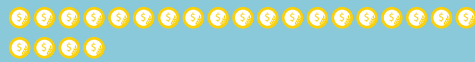
**Health**

**C\$ 1,430 million** | US\$ 70.3 million



**Tourism**

**C\$ 245 million** | US\$ 12.1 million



**Time wasted**  
(time spent to access toilets, etc.)

**C\$ 177 million** | US\$ 8.7 million



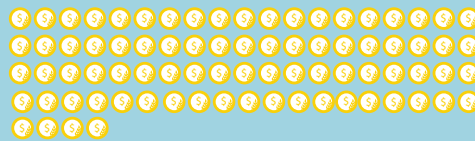
**Water resources**  
(drinking water)

**C\$ 59 million** | US\$ 2.9 million



**Total loss**

**C\$ 1912 million** | US\$ 95 million



Health  
75%



Tourism  
13%



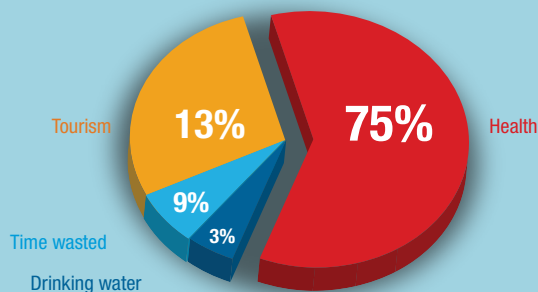
Time wasted  
9%



Water resources  
(drinking water)  
3%



**Total loss (percentages)**



The economic losses due to the lack of sanitation and hygiene in 2009 amount to C\$ 1,900 million (US\$ 95 million). In order to have a clear idea of the relative impact on the Nicaraguan economy, where the level of average prices corresponds to 41% of that in the US, the impact in international dollars (ID) is 293 million, or ID 51 per capita every year.

In the case of Nicaragua, the impacts were evaluated according to these categories, because they all have a great importance nationwide.

Of the assessed impacts, health represents 75% of the economic costs estimated in the impact, followed by the 3% of what a person spends in order to access drinking water, 9% of additional time used to access precarious sanitation systems, and 13% of losses suffered by international tourism.

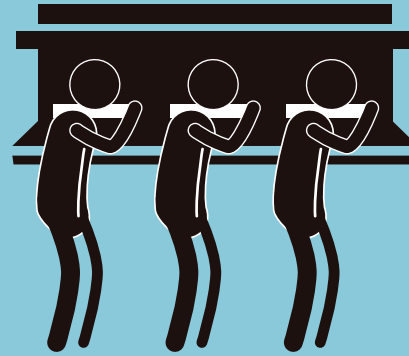
Such impacts could cause a wide range of direct financial losses, as well as indirect or non-monetary losses for the Nicaraguan population, which would have to pay for health services or clean water supply, or lose income on account of tourism or health problems.

# Impacts on health

Lack of sanitation and hygiene causes over 4,6 million episodes of diseases or infections, and almost 500 premature deaths every year. The resulting economic impact corresponds to some C\$ 1,430 million (US\$ 70 million) per year.

The impacts on health and the associated costs with the lack of sanitation and hygiene are assumed out of all proportion by the poor. The estimated annual cost per capita ranges from C\$ 160 in the departments with lower poverty rates (for example, Managua) to over C\$ 400 in the departments with higher poverty rates (for example, the Región Autónoma del Atlántico Norte).

Lack of sanitation and hygiene causes almost



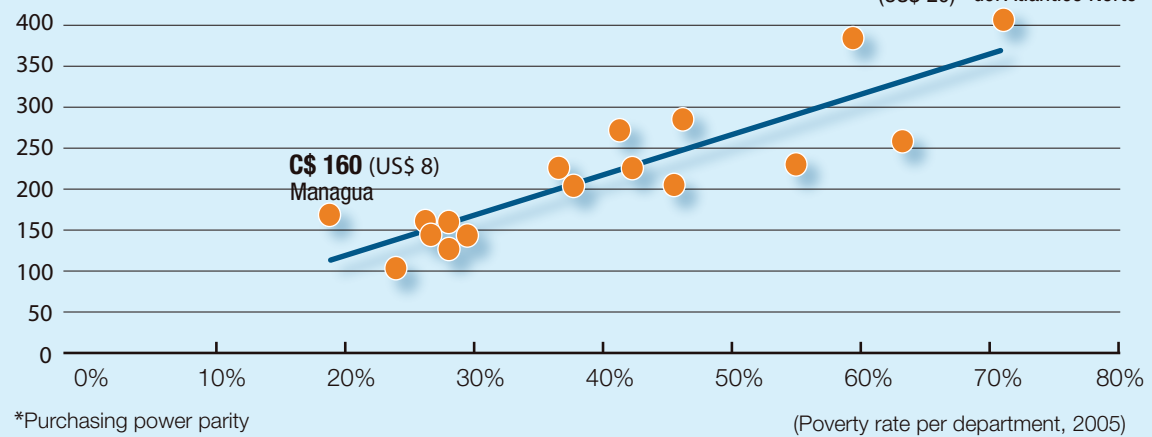
**500** PREMATURE DEATHS PER YEAR

which economic impact corresponds to some

**C\$ 1430** million every year  
US\$ 70 million every year

## Health annual per capita costs

(In C\$, 2009 PPP\*)



Source: Estimated from World Bank data (2010)

# Impacts on water resources

A poor sanitation system contributes to a great extent to the pollution of water resources. This adds up to households with access to a clean, safe water supply.

## Costs of treating water

Reported by the Nicaraguan Company of Aqueducts and Sewers

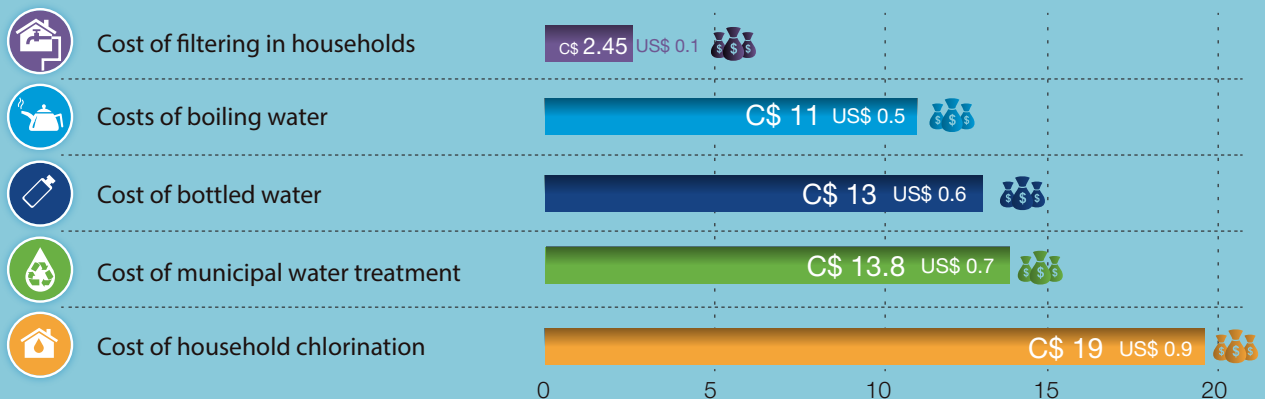


The economic costs associated to polluted water due to lack of or poor sanitation systems represent **C\$ 110 million (US\$ 5,4 million)** per year, without considering the access to clean water unrelated to human consumption, as well as the loss of the productive value of fishing and agriculture due to polluted water.

Around 320 million cubic meters of water were produced in 2010 by drinking water suppliers. The cost of treating water reported by the Nicaraguan Company of Aqueducts and Sewers (ENACAL) is around C\$ 20 million (US\$ 1 million) per year, of which 75% could be avoided if there were no pollution risks due to sanitation. The economic cost ranges from C\$ 85 and C\$ 136 million (US\$ 4,2 – 6,7 million) per year, with an average estimate of C\$ 110 million.

## Costs of access to drinking water per year

(Average cost estimated in millions of Cordobas)

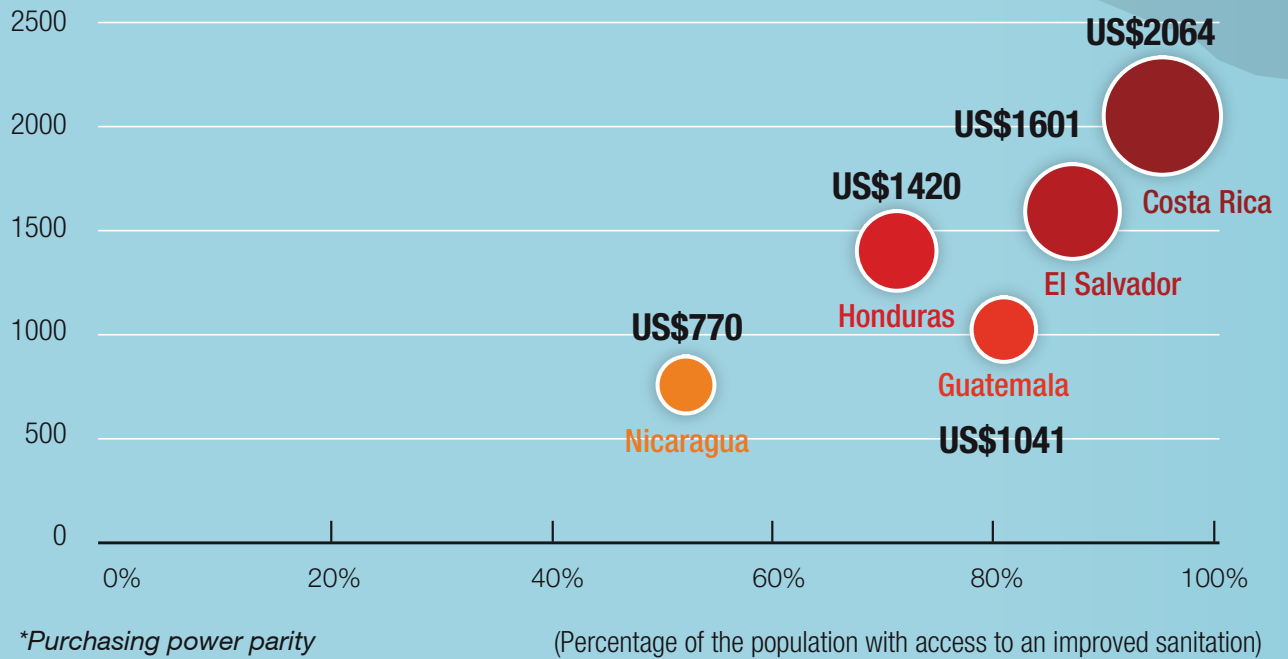


Source: Estimated from authors and an environmental health study of the World Bank.

# Impacts on tourism

## Income of international tourism per arrival

(In US\$, PPP\*)



Source: Estimated from World Bank data (2010).

Tourism is an important source of jobs and tax income for Nicaragua, generating C\$ 7,000 million in revenue (around US\$ 346 million).

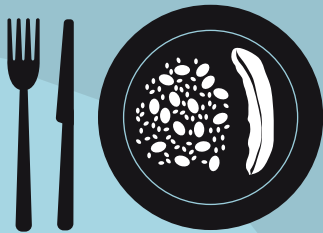
The number of tourists who chose Nicaragua as a vacation destination is related, among other aspects, with the sanitary conditions of the country, such as the quality of the water resources, the quality of the outdoors (landscapes pleasant to the sight and smell), food safety (hygiene in the preparation), availability of comfortable toilets and privacy in hotels, restaurants, tourist locations, bus terminals, and the implied health risks.

The economic losses are clear due to the existing gap between the current tourism income and the eventual income with a higher number of visitors with higher daily expenses, and extended visits, which sanitation and hygiene could generate.

The tourism income per arrival in Nicaragua was US\$ 322 in 2008. The correlation between the coverage of improved sanitation and the income from international tourism per arrivals (adjusted PPP / US\$) for Nicaragua and neighboring countries is presented in the previous chart. Incidentally, Nicaragua has the lowest population coverage with access to improved sanitation services than neighboring countries.

## Considerations for choosing a touristic destination

### A Food safety



### B Quality of the outdoors



### C Availability of comfortable toilets



### D Implied health risks



## Other non-assessed impacts on welfare

Several impacts derived from the deficiencies in sanitation and hygiene could not be quantified due to lack of information, but the influence they have in people's behavior and general welfare are well-known:



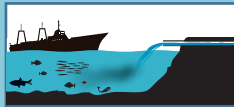
Health problems (typhoid)



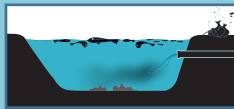
Lack of adequate bathrooms (people's preference or habits to defecate in a safe, convenient, and private place)



Expenditure for water treatment to be used for productive purposes



Additional expenses in the fishing industry



Reduction of opportunities and the recreational value of areas close to sources of polluted water



Less economic activity and foreign investments



Less availability and value of the land



If we could quantify all these effects in the study, the total impact would far exceed the estimate of C\$ 1,912 million, thus the savings would be much more than C\$ 1,600 million.

**C\$ 1,600 million**  
US\$ 80 million



## 3. Conclusions

1

### Big losses

The lack of sanitation represents big economic losses for the Nicaraguan economy, not only in the private sphere of the people, but also for the public and commercial sectors.



2

### More investments

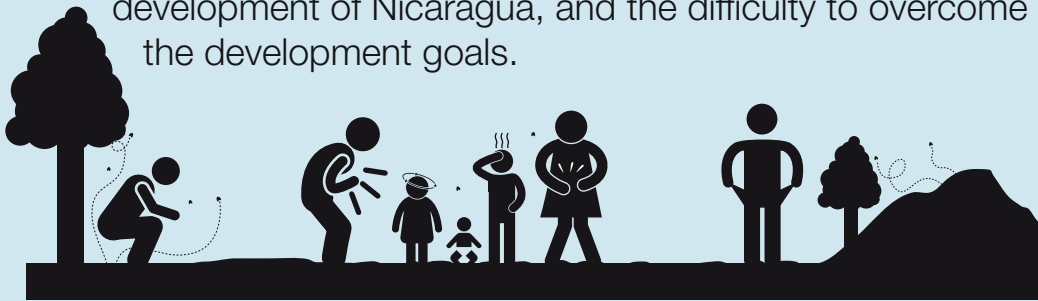
The results of the study support the need to make more investments in sanitation infrastructure and in the promotion of better hygiene practices.



3

### Implications for development

The results show that the lack of sanitation and hygiene entail big losses with serious implications on the social and economic development of Nicaragua, and the difficulty to overcome the development goals.



4

### Link with the MDGs

The study emphasizes the existing relationship between improved sanitation and the rest of the Millennium Development Goals (MDGs) such as poverty reduction, child health improvement, and larger access to safe drinking water.



# Conclusions

5

## Most vulnerable population

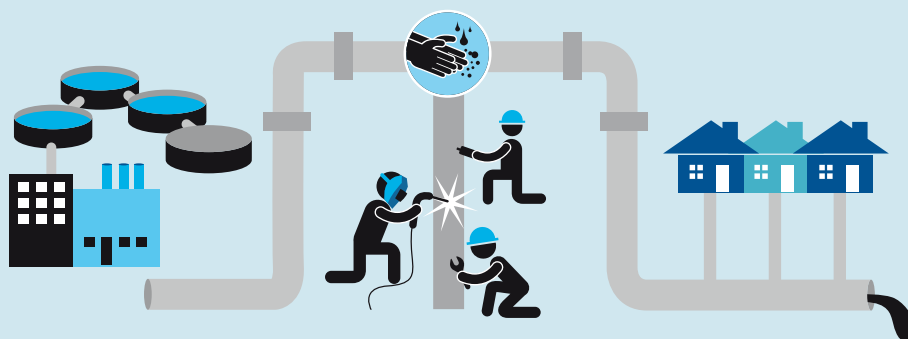
The study demonstrates that the lack of sanitation affects the whole population, especially the households with no improved sanitation systems, corresponding to the poorest and most vulnerable segment of the population.



6

## Prioritizing sanitation

Sanitation should receive more attention from all levels of the Government in Nicaragua, donors, private sector, and people.



## 4. Recommendations

- 1 Provide higher priority to investments in the sanitation and hygiene promotion

The **economic loss** due to **lack of sanitation** in 2009 was

**C\$ 1912 million**  
US\$ 95 million

This amount could have covered:  
The public expenditure in education for



\* BCN Nicaraguan Central Bank, June 2009.

The economic costs (C\$ 1,912 million or US\$ 95 million) are considerable, because they represent 1.5% of the GDP in 2009. Therefore, the benefits for development derived from investments in this matter are huge, because they will allow saving at least C\$ 1,600 million. The investments will even contribute to alleviate countless impacts that haven't been assessed in the study. Having an improved sanitation will allow reaching other development goals, including some key MDGs.

# Recommendations

## 2 The sanitation programs must direct investments to the poor urban and rural areas

### Rural areas

Sanitation programs that **terminate open-air defecation** have to be proposed in order to reduce the **event of diseases** to the limit.



The sanitation programs must focus mainly on families with small children, because they represent the most vulnerable segment of the population facing the negative effects of inadequate sanitation in the public health. Special attention should also be given to the rural areas where families practice subsistence farming, and have limited income and purchasing power. Likewise, the sanitation programs should focus on a comprehensive coverage aiming to eliminate open-air defecation in order to reduce the event of diseases to the limit.

### Poor urban areas

Support sanitation in depressed urban areas. Human excreta with no adequate treatment **contaminate water sources** and **boost the public health risks**.



Another priority should be the support of sanitation systems in depressed urban areas where ownership of houses is low, and therefore families cannot improve their sanitation conditions individually, but through a community response. In these confined spaces, human excreta that are not adequately disposed of or treated will contaminate water sources, drains, rivers, Canals, riverbeds, and will skyrocket the public health risks in the population living nearby.

- 3 Strengthening promotion and information campaigns to improve **personal hygiene** practices.

HANDWASHING



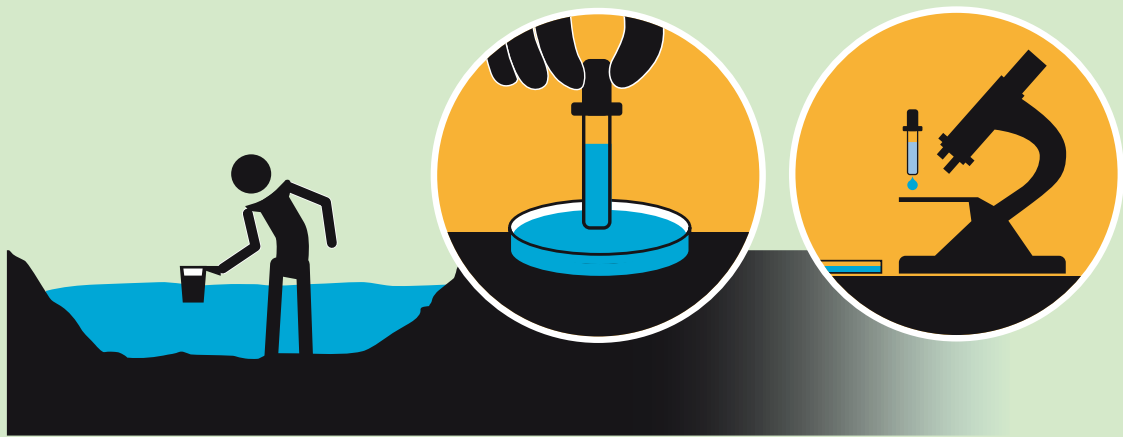
The study demonstrated that significant economic losses derive from the lack of personal hygiene practices. A simple and low-cost intervention such as washing hands with soap can generate monetary benefits since it represents a lower rate of morbidity and savings of public health costs.



## Recommendations

- 4 Improving **monitoring and evaluation** of the impact caused by the options of improved sanitation in Nicaragua.

It is necessary to introduce a systematic and practical structure of **qualitative water surveillance** in the country



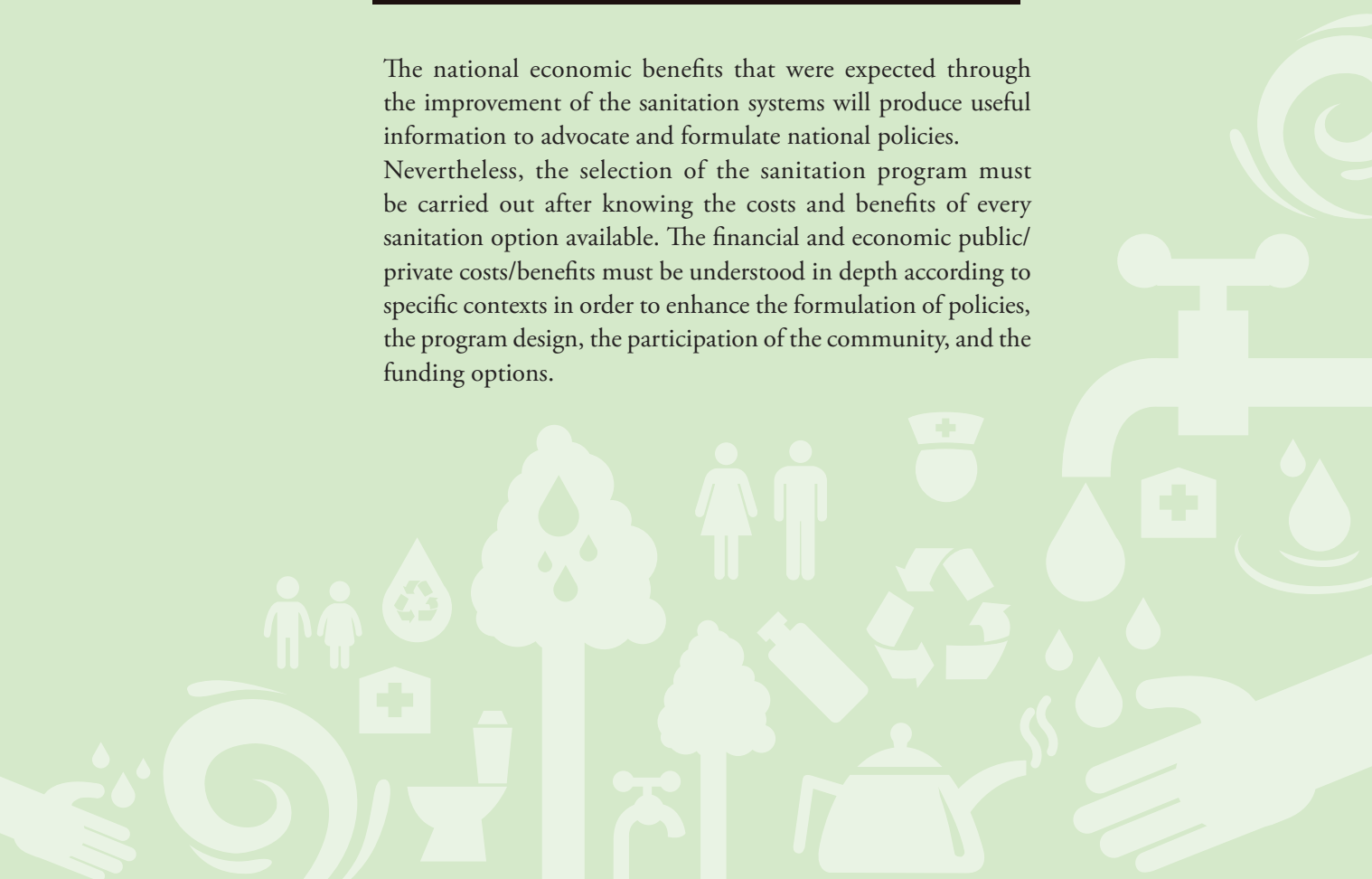
It is necessary to introduce a systematic and practical structure of qualitative water surveillance in the country involving the evaluation of health risks, in order to analyze—in a periodical and realistic manner—the water quality and to inform how to prevent the public health risks posed by the different sources of pollution. An evaluation system needs to be created to detect the areas with higher risk, in order to improve the health conditions of the people.







The national economic benefits that were expected through the improvement of the sanitation systems will produce useful information to advocate and formulate national policies. Nevertheless, the selection of the sanitation program must be carried out after knowing the costs and benefits of every sanitation option available. The financial and economic public/private costs/benefits must be understood in depth according to specific contexts in order to enhance the formulation of policies, the program design, the participation of the community, and the funding options.







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