



INTERNATIONAL LABOUR ORGANIZATION
EMPLOYMENT INTENSIVE INVESTMENT PROGRAM



**SERIES: GUIDES FOR INTEGRATED RURAL ACCESS
PLANNING AND COMMUNITY CONTRACTING IN THE
WATER AND SANITATION SECTOR**

GUIDE N° 1

**CONCEPTUAL GUIDE FOR INTEGRATED RURAL ACCESS PLANNING AND
COMMUNITY CONTRACTING IN THE WATER AND SANITATION SECTOR**

WITH AN APPROACH ON GENDER AND INTER-CULTURALITY

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Geneva, January 2015

PRESENTATION

The ILO Employment Intensive Investment Programme (EIIP) has been using the Integrated Rural Access Planning (IRAP) and Community Contracting (CC) tools for some years in order to plan and execute public works infrastructure in several sectors and levels of government. After having conveniently adapted and updated these tools by including an inter-cultural and gender-based approach, they have proven to be valid and effective for the Water & Sanitation Sector (W&S) as concerns their application among dispersed rural and indigenous populations and therefore the ILO considers that they can be applied in different national and local contexts.

One of the characteristics of how both tools have been adapted to the W&S sector has been the formulation and inclusion of a consultation process with indigenous populations under the framework of Convention 169. This process has been carried out in Paraguay¹ through participatory workshops with the attendance of traditional and local authorities. The exercise enabled us to identify basic concepts and procedures such as the different levels of hierarchy consulted inside the communities and the corresponding management of the time this process takes, as well as an appraisal of the indigenous knowledge with regard to the location and management of water resources appropriate for their eco-system. Understanding these processes under the framework of an inter-cultural and social dialogue has helped to determine basic procedures in order to include them in future W&S Sector planning and implementation processes.

The adaptation carried out stems from the experience in Paraguay, however, the achievements of other IRAP processes in countries such as Cambodia, the Philippines', India, Indonesia, Laos, Nepal, Nicaragua and Panama have also been taken into account. This has also been the case of Community Contracting processes fostered in countries such as Ghana, Guatemala, Haiti, Madagascar, Mali, Nias, Pakistan, Peru, Somalia and South Africa.

How the adaptation process was developed is presented in a series of three documents:

1. **Guide N°1:** Conceptual Guide for an Integrated Rural Access Planning and Community Contracting in the Water and Sanitation Sector.
2. **Guide N° 2:** Development of integrated rural access planning processes in the water and sanitation sector.
3. **Guide N° 3:** Community contracting to execute public works and manage services.

¹ From 2009 to 2012 and within the scope of the Millennium Development Goals, Paraguay developed a "Strengthening capacities for the definition and implementation of Water and Sanitation policies" Programme. Although the practical application was only done at a pilot level, its scope was sufficient to cover the communities and ethnic groups that participated and who fully validate the model applied.

The purpose of this series of published guides is to contribute to the development of the Water and Sanitation Sector (W&S)² in different local and national dispersed rural populations. Consequently, the adapted and updated IRAP tool should be integrated and increasingly applied in W&S projects and programmes at a global level and the Community Contracting methodology should be adapted and updated in order to be used in sectoral and local government programmes and projects in the context of Rural Economies integrated into the IRAP, beyond the water and sanitation sector.

Guide N° 1 presents the Conceptual Framework which the ILO considers should prompt the development of the W&S Sector by first of all recognizing that the supply of water and sanitation for personal and domestic use has been recognized by the United Nations as a fundamental human right and that this should also be a determining factor in order to reach the sustainable development goals. This Guide also includes some basic notions concerning water management related to risk management as well as specific accomplishments of the ILO concerning rural access and community contracting planning, and particularly, as concerns the framework of the ILO Indigenous and Tribal Peoples Convention 169 regarding carrying out consultation processes whenever these communities are involved.

The Guide has three chapters: the first provides the conceptual framework of water understood as a human right and its conceptual link to sustainable development and W&S risk management; the second chapter presents the methodologies and instruments that will be used and adapted to the W&S Sector, including a reference to ILO Convention 169 on indigenous people; and the third chapter presents the adaptation of IRAP to the W&S Sector, the case of Paraguay, and provides a descriptive example of how a prioritized system has been applied based on a multiple factor matrix that distinguishes it from the original IRAP model.

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Geneva, January 2015

² The water sector in general, either for consumption or production, such as irrigation systems and watershed management.

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ACRONYMS

W&S	Water and Sanitation
CC	Community Contracting
RWQE	Rapid Water Quality Evaluation, PAHO/WHO methods
FAO	United Nations Food and Agriculture Organization
IWRM	Integrated Water Resource Management
GPS	Global Positioning System
AI	Access Indicator to IRAP
ICESCR	International Covenant on Economic, Social and Cultural Rights
UNO	United Nations Organization
ILO	International Labour Organization
PAHO/WHO	Pan American Health Organization /World Health Organization
NGO	Non-Governmental Organization
IRAP	Integrated Rural Accessibility Planning
W&S IRAP	W&S Integrated Rural Accessibility Planning
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
SENASA	National Water and Environmental Sanitation Service (Paraguay)
UNS	United Nations System
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
UNW-DPAC	UN-Water Decade Program on Advocacy and Communication
US \$	United States Dollars
WWAP	World Water Assessment Programme
WWDR	World Water Development Report

1. CONCEPTUAL FRAMEWORK

This part of the Guide aims at providing the essential concepts that those who monitor or promote the Integrated Rural Access Planning to Water and Sanitation W&S IRAP must manage in their field work as part of their responsibilities.

1.1. Water as a human right³

On 28 July 2010, the United Nations General Assembly adopted [Resolution 64/292](#) which explicitly recognised the human right to water and sanitation and acknowledged that safe drinking water and sanitation are essential to the realization of all human rights; deeply concerned that an estimated 884 million lack access to safe drinking water and more than 2.6 billion people have no access to basic sanitation; alarmed that approximately 1.5 million children under 5 years of age die and 443 million school days are lost each year as a result of water and sanitation-related diseases; explicitly recognized **the human right to water and sanitation**, reaffirming that clean and safe drinking water are essential to the realization of all human rights

The United Nations General Assembly has explicitly recognized the right to water and sanitation as essential resources for the realization of human rights

The Resolution calls upon States and international organizations to provide financial resources, build skills and transfer technology through international assistance and cooperation, in particular for developing countries, in order to scale up efforts to provide safe, clean, accessible and affordable drinking water and sanitation for all.

States should provide safe, clean, accessible and affordable drinking water and sanitation for their entire population.

1.1.1. What does this mean in this context?

Sufficient. The water supply for each individual must be sufficient and continuous for personal and domestic uses. These uses ordinarily include drinking, personal sanitation, washing of clothes, food preparation, personal and

³ The right to water. Fact Sheet N° 35. United Nations Human Rights Office of the High Commissioner. <http://www.ohchr.org/Documents/Publications/FactSheet35sp.pdf>

household hygiene. According to the World Health Organization (WHO), between **50 and 100 litres** of water per person per day are needed to ensure that most basic needs are met and few health concerns arise.

Safe. The water required for each personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person's health. Measurements of drinking-water safety are usually defined by national and/or local standards for the quality of drinking-water. The **World Health Organization (WHO) Guidelines for the quality of water** provide a basis to develop national standards that, if properly implemented, will ensure the safety of drinking water.

Acceptable. Water should be of an acceptable colour, smell and taste for each personal or domestic use. [...] All water facilities and services must be **culturally** appropriate and sensitive to **gender, lifecycle** and **privacy** requirements.

Physically accessible. Everyone has the right to a water and sanitation service that is physically accessible within or in the immediate vicinity of the household, educational institution, workplace or health institution. According to WHO, the water source has to be within 1,000 meters of the home and collection time should not exceed 30 minutes.

Affordable. Water, and water facilities and services, must be affordable for all. The United Nations Development Programme (UNDP) suggests that water costs should not exceed **3 per cent** of the household income.

1.1.2 Does the right to water mean that the supply should be free?⁴

The human rights framework does not establish the right to a free supply of water. However, the right to water means that water supply services must be affordable for all and that nobody should be deprived of access to water because they cannot pay for it.

In certain circumstances, access to drinking water and sanitation services may have to be low cost or free of charge if the person or family is unable to pay. In these cases, the State must adopt the necessary measures.

The human rights framework does not establish the right to a free supply of water

If families cannot afford it, the State must adopt measures to provide a free of charge or low cost service

⁴ *Ibidem*

1.1.3 Does the right to water include the water needed for agriculture and pasturelands?

Water is indispensable for life, but it is also of the essence for food security, income generation and environmental protection. The right to water only covers personal and domestic use, that is, for consumption, to wash clothes, prepare food, and for personal and domestic hygiene. It does not include the water needed for agriculture or pasturelands or to maintain ecological systems.

The right to water does not include the water needed for agriculture, pasturelands or to maintain ecological systems

Access to water for agriculture, particularly as concerns small landowners, is part of the right to adequate food as established in Article 11 of the Covenant⁵. However, the declaration in General Comment Nº 15⁶ of the Committee of Economic, Social and Cultural Rights states that priority must be given to "the water resources needed to prevent starvation and disease, as well as to meet the core obligations of each of the Covenant's rights."

Since all human rights are inter-dependent and indivisible, it can be said that the right to water allocates priority to the use of water for agriculture and pastureland as required to avoid starvation.⁷

Access to water for agriculture, particularly as concerns small landowners, is part of the right to adequate food

⁵ The International Covenant of Economic, Social and Cultural Rights (ICESCR) was adopted by the United Nations General Assembly through Resolution 2200A (XXI) on December 16, 1966 and entered into force on January 3, 1976. Through this treaty the parties pledge to work to grant the economic, social and cultural rights of individuals, including the right to labour, health and education and an adequate standard of living.

⁶ General Comment No. 15. The right to water. United Nations Committee of Economic, Social and Cultural Rights. November, 2002. Taken from: The human right to water and sanitation reader. UNO Programme - http://www.un.org/spanish/waterforlifedecade/pdf/05_2011_human_right_to_water_reader_spa.pdf

⁷ *Ibidem*. Pág.13.

1.1.4 The link between the right to water and other human rights

Access to drinking water is a fundamental prerequisite for the realization of other human rights, such as the right to education, housing, health, life, employment and protection against cruel, inhuman or degrading treatment or suffering. It is also a crucial element to achieve gender equality and to eradicate discrimination.

Access to drinking water is essential to achieve gender equality and to eradicate discrimination

The lack of access to drinking water and sanitation services also has serious consequences on the right to health. According to the UNDP, each year an estimated 1.8 million children die due to diarrhoea and other diseases as a result of unsafe water and deficient sanitation, a figure considerably higher than the number of victims due to armed conflict. The collection of water from distant sources also poses serious consequences to people's health, particularly as concerns women and children. Aside from the burden of having to carry water, women and children are also exposed to water-borne diseases.

The fact that the largest part of the collection of water lies in women and children it bring consequences to health, education and other productive activities

1.1.5 How important is a potable water supply rights-based approach?

A Human Rights perspective of a potable water supply and sanitation services approach must serve as an encouragement to mobilize people, in particular the poor and marginalised, to inform them of their legal rights and to empower them to enjoy these rights. The Human Rights-based approach frees the supply of drinking water from being considered as an act of welfare and today is recognized as a legal right. In this manner, the human being becomes the central element of water problems.

In a Rights-based approach, the supply of drinking water is far from being an act of welfare but a recognized legal right

However, we must remember that a human rights framework does not automatically resolve difficult legal, financial, administrative, technical or other issues that must be addressed in order to provide an adequate supply of water. Notwithstanding, this framework does provide for international standards that can guide political and economic decisions regarding resource allocation to satisfy this need.

The Rights-based approach does not resolve legal, financial, administrative or technical difficulties but provides guidance for political decisions and resource allocation

Even though the human rights-based approach is strictly applied to the personal and domestic use of water, it can and must be used to study broader issues such as water resource planning and management.

1.2 Groups that must benefit from the application of a human rights-based drinking water supply policy⁸

From the human rights perspective, the water supply and sanitation approach indicates that people and communities must participate in decision making concerning water and sanitation to avoid being excluded from this process of which they are an important part. Community participation in the planning and formulation of water supply and sanitation services programmes is extremely important in order to ensure that these services are relevant and adequate, and therefore, sustainable in the long term.

People and communities must participate in decision making concerning water and sanitation to avoid being excluded from this process of which they are an important part

⁸ *Ibidem*. Pag.7

The lack of water and sanitation mainly affect the urban and rural poor; women; girls and boys; people with disabilities; displaced people and indigenous peoples

1.1.1 The urban and rural poor

The urban and rural poor usually do not have access to drinking water and sanitation. The poor not only have fewer possibilities of having drinking water and sanitation they also have less capacity to cope with the consequences of this deprivation. The major portion of people who do not have drinking water and sanitation, that is more than 1 billion people, live in rural areas and discharge their bodily waste outdoors, with considerable consequences to their health, privacy and even their physical well-being.

The urban poor, which represent 42% of the urban population in developing countries, live in precarious settlements and in addition have difficulties to have access to drinking water. These inhabitants have an irregular supply of water from unprotected sources, such as wells or irrigation canals, or are obliged to pay for water from informal vendors at prices much higher than those paid by people who have household water supply connections. In many cases, even if they do have such connections, when there are water shortages their water supply is rationed in order to serve more affluent neighbourhoods.

1.1.2 Women

The lack of access to drinking water and sanitation services especially affects women. If a household has no drinking water, it is usually the women and girls who have the duty of fetching water. This chore is time consuming and also a heavy load to carry. Very often the women and girls spend up to four hours daily to fetch water, from walking to the water source, standing in line to fill the water canisters and buckets and then carrying them back home. They could very well use this time for productive activities or for household chores, in the case of women; or could go to school, in the case of girls. In many cases, the water they collect is dirty and comes from unprotected sources which pose health problems to the families.

It has also been noted that women are often excluded from sharing in the decision making concerning water and sanitation. As a result their specific needs

and circumstances are not taken into account when water supply and sanitation programmes are being formulated or expanded.

Women participation in the planning processes aimed at solving water supply problems is paramount since it is generally them who are in charge of water collection

1.1.3 Boys and girls

Drinking water and sanitation are critical for children's health. In countries with a high rate of child mortality, diarrhoea is the leading cause of death in children under 5 years old – more than pneumonia, malaria or HIV/AIDS combined. More than 90% of child mortality cases are related to the consumption of polluted water or inadequate sanitation. The lack of drinking water increases the vulnerability of children to disease. Since their immune system (or immunological system) and its detoxification mechanisms have not been fully developed yet, children have lower defences to cope with against water-borne infections or chemical pollution.

The right of girls to education is also affected. In many countries parents do not send their girls to school because it has no independent sanitary services for girls. In Nigeria, for example, parents have taken their girls out of school because they had to go to the bathroom in open air. In Uganda, 94% of the girls stated that they had had **problems at school during their menstruation** and 61% said that when they menstruate they do not go to school.

In Uganda, 94% of the girls stated that they had had problems at school during their menstruation.

61 % of them stopped going to school during those periods due to the lack of personalized toilets for women

1.1.4 People with disabilities

The possibility of having access to water supply and sanitation services is crucial for people with disabilities who **historically have been marginalised and discriminated against, because, aside from other reasons, their special needs were not taken into account when designing the buildings, services or infrastructure.** However, access to water and sanitation services is indispensable since it would enable people with disabilities to be independent and would show respect for their dignity. In many cases, this involves **minor changes in the design**

of the facilities and low cost adjustments in order to make water and sanitation services accessible for them. The Convention on the rights of people with disabilities expressly refers to their access to water as concerns the right to an adequate standard of living and social protection.

Access to water and sanitation services is crucial since it would enable people with disabilities to be independent and would show respect for their dignity

1.1.5 Refugees and internally displaced people

Each year, more than 30 million people flee from their homes due to conflict or natural disasters and more than 200 million are affected by natural hazards. **During emergencies, displaced people face special difficulties as concerns access to drinking water and sanitation which may put their lives at risk.**

Displaced people are also particularly **vulnerable vis a vis discrimination, racism and xenophobia** and this may **narrow their chances of having access to drinking water and sanitation services.**

Camps for refugees or the internally displaced all around the world are characterised by the fact that they eventually become over-crowded and provide inadequate basic services, particularly when the time spent in these camps is long.

Poor sanitation and lack of access to safe drinking water in refugee and internally displaced persons camps, frequently lead to the spread of waterborne diseases, such as cholera

Women and children who look for water far from these camps may be victims of harassment, threats and sexual violence. Furthermore, **they even may be subjected to having to surrender sexual favours in exchange for drinking water.** As concerns sanitation services, even when these people are inside these camps, generally speaking, the **concerns of women, children and the elderly or people with disabilities are not taken into account.** In many countries, the internally displaced and refugees who live in camps are given less water than the rest of the population and many **survive on 2 to 3 litres per day.**

1.1.6 Indigenous people

Water plays a fundamental role in the lives of indigenous people, since aside from using water for domestic chores or to drink it, **water is a central component of their traditions, culture and institution**. The right to water barely covers a small dimension of this relation: access to drinking water for personal and domestic use.

Natural sources of water traditionally used by indigenous people, such as lakes or rivers, may not be accessible for them today because their land has been expropriated or is being used by third parties. Access may be under threat due to illegal pollution or an excessive exploitation of water and forests. Furthermore, water sources of indigenous people may have been deviated to supply water in urban areas.

Thus, in order to guarantee the right to water of indigenous people, in many cases measures may have to be adopted in order to ensure their rights to ancestral land, to strengthen their traditional systems as concerns the use of water and to protect their natural resources.

Indigenous people are usually excluded from decision making processes concerning water and sanitation and this may be an additional hurdle that obstructs having access to these services.

In many cases guaranteeing the right to water of indigenous people implies ensuring the right to their ancestral lands

1.2 Water and Sustainable Development⁹

Sustainable development is defined as « development that meets the needs of the present without compromising the ability of future generations to meet their own needs»¹⁰. Sustainable development has also emerged as the governing principle for the development of the world in the long term. The Brundtland Commission focused on three pillars of human wellbeing: economic, social-political and ecological/environmental conditions. The basic concept supports the adoption of decisive measures to boost economic and social development, especially for people in developing countries, while also guaranteeing the integrity of the environment for future generations.

⁹ Report "Our Common Future " 1987, of the World Commission on the Environment and Development http://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/images/sustainable_development_eng

¹⁰ Our Common Future: <http://www.upv.es/contenidos/CAMUNISO/info/U0506189>

1.2.1 What does water have to do with sustainable development?

Recognizing that water is a finite resource fundamental for the wellbeing of humanity and is only renewable if managed well, an intelligent management of water is a prerequisite for sustainable development. Well managed, water plays a vital role in building the capacity of social, economic and environmental systems to adapt in view of the quick and unpredictable changes of today's world.

Water is a renewable resource if it is well managed
An intelligent management of water is a prerequisite for sustainable development

Water is fundamental and cuts across all three dimensions of sustainable development. The sectoral approach must evolve into a multi-disciplinary approach that encompasses the inter-relationships among food, energy, health, trade, the environment and water for direct human use.

A multi-disciplinary approach that encompasses the inter-relationships among food, energy, health, trade, the environment and water for direct human use

The domestic sector represents 10% of the total use of water at a global level. However, in 2011, an estimated 768 million people did not have access to an improved source of water and 2.5 billion were still without access to improved sanitation services. **According to the United Nations the solutions in this sector must focus on the provision of services and not only on the installation cost.** Efforts must be geared towards guaranteeing that the services are financially feasible; improving the accountability and transparency of the management; strengthening the independent regulating agencies and supervising the progress and inequalities in the service.

The creation of new infrastructure, being essential is not enough to increase the coverage of sanitation and hygiene. A renewed approach must be adopted as concerns the transfer of social standards.

According to the United Nations the solutions in the domestic sector must focus on the provision of services and not only on the installation cost

Agriculture represents 70% of the global use of water, although this figure varies considerably from one country to the next. Irrigated agriculture is the predominant system of production. This method is half as efficient as compared to an optimum water management for agriculture. In 2050, the world agriculture will have to produce an additional 60% more food at a global level, and 100% more in developing countries. According to FAO, resources must be used more efficiently; more direct actions must be developed to conserve, protect and improve natural resources; the livelihoods of rural inhabitants and social welfare must be protected and improved; the capacity of people, communities and ecosystems to adapt must be stronger, particularly as regards coping with climate change and market volatility. Good governance is of the essence for the sustainability of natural and human systems.

**Agriculture is the world's largest consumer of water
Good governance in this sector is the essence for the sustainability of
natural and human systems**

The industry represents 20% of the demand for water at a global level. According to UNEP, 2011, actions from this sector to cope with the sustainability of water come from two opposite directions. **Governments usually adopt the top down approach.** This includes the adoption of policies and the regulation and application of incentives. **The bottom up approach deals with eliminating specific sources of pollution.** In the past these approaches focused on technology and yield, disregarding prevention and the efficient use of resources which is now the aim.

**The industry deals with eliminating specific sources of pollution
Governments should adopt policies to regulate the sector and apply
incentives aimed at achieving efficiency in water management**

1.2.2 Water and eco-systems¹¹

The degradation of the environment around the world has reached a critical level in which the most important eco-systems, such as the oceans, have approached thresholds that could unleash a massive collapse.

The inclusion of the concept of sustainability in the management of eco-systems is key. For this purpose the following criterion should be taken into account:

- **Integration:** collaboration and coordination among the sectors and from these to natural resource managers;
- **Configuration and implementation of an adjustment policy:** regulation, application and compliance;
- **Economic rationality** as concerns the solutions, such as the natural and age-old inherited infrastructure;
- **Valuation of services offered by eco-systems,** including the oceans, making such services more important for ordinary citizens;
- **Implementation of watershed management plans.**

Water management with a basin criterion is considered as the best tool for multi sectoral water management and thus avoid the deterioration of the environment

1.2.3 Water and climate change

Population growth and higher standards of living trigger a growing demand for water. The holistic approach of the Integrated Water Resource Management (IWRM) has been internationally accepted as the next step in the road towards efficiency, equality and sustainable development. Along this road, water management must be understood as the management of a limited resource that must deal with conflictive demands.

Sustainable management of water resources means balancing freshwater supplies with demands so as to ensure the availability of sufficient and qualitative water for the future

¹¹ Taken and adapted from “*Water and sustainable development Information brief*”. UN-Water Decade Programme on Advocacy and Communication (UNW-DPAC).
http://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/images/sustainable_development_eng

An adaptive approach¹² that has sound strategies and effective solutions and focuses on satisfying needs is adequate to cope with the uncertainties generated by climate change forecasts. The generation of knowledge must aim at improving the understanding of stakeholders who intervene in water management regarding the interactions and feedback between the water cycle and other natural and human processes, such as, the carbon cycle, the population growth, food production, the consumption of energy and services provided by ecosystems.

Intelligent water management involves the understanding of the existing interactions and feedbacks between the water cycle, carbon cycle, population growth, food production, energy consumption, and services provided by ecosystems

One priority is to foster the skills of technicians, water managers and politicians in order to maximize the generation of useful knowledge. Communication of the observations, thoughts and available forecasts on the environment and social and economic affairs including their uncertainties, is fundamental in order to successfully implement policies.

New technologies used to generate, visualise and communicate data and to develop simulations and analyse scenarios can be used as inputs for diagnosis, evaluations, monitoring, forecasts and estimates needed by users in order to adopt a broad range of climate-related decisions at a national and local level. There is a persistent need to develop institutions in order to enhance social adaptation vis a vis climate change.

Decisions for the adaptation to climate change must be taken now

¹² Source: WWDR 2015 – UNO in-house draft – Water for work, August, 2014 (WWAP, 2015).

1.3 The implementation of Risk Management in Water and Sanitation¹³

1.3.1 Why do we need risk management for water?

Through the centuries societies all around the world have learned to live under the threat of natural disasters. **Today climate change means that we have learned how to live in a world of increasingly bigger risks.** Moreover, the fact that we now have a global economy brings with it the risk of social and economic disasters spurred by fluctuations of the global financial market.

By developing solutions to manage higher risks **we can learn how to protect poor and vulnerable communities that bear the brunt of the effects of natural and anthropic disasters.** New strategies are needed as well as an improved capacity to adjust to change.

The uncertainty posed by climate change requires the design of new strategies and the development of capacities to absorb the change

1.3.2 What should we do?

The following are the key aspects to cope with water-related disasters resulting from climate change:

- 1) **Increase the knowledge** of the communities at risk vis a vis water-related disasters provoked by climate change;
- 2) **Adopt integrated disaster risk management**, including structural and non-structural approaches;
- 3) **Adopt and enforce surveillance systems**;
- 4) **Apply a ‘be prepared approach from the onset to the outcome’** that will keep the community of users ready to respond in case of a disaster (UN-Water, 2014).
- 5) **Develop infrastructure** that helps to cope with climate change. This includes the use of natural infrastructure, such as watersheds and wetlands, aside from building water management infrastructure, for instance, embankments, dams, canals, etc.
- 6) **Build skills** as much as possible whenever insufficient. **Traditional knowledge must be recognized and used.** Public awareness and professional education must cover the interdependency of disasters and development, climate

¹³ Taken and adapted from: Risk_management_water_sanitation eng:01 issue briefs 17/12/14, 12:23. UN-Water Decade Programme on Advocacy and Communication (UNW-DPAC).

change, the risk of a disaster and adaptation. As a whole these are the foundations of a **risk reduction culture**.

Traditional knowledge must be recognized and used for infrastructure and capacities development

1.4 Evaluation of the quality of drinking water

According to the World Health Organization¹⁴, experience has revealed that the **danger of microbial infections continues to be the main concern as regards water**, both in developed and developing countries.

This experience has demonstrated the value of applying a systemic method to guarantee that drinking water is free from microbes, as is shown in this chapter.

1.4.1 Risks related to a bad quality of water. Water-borne diseases.

Water-borne diseases are directly related to the quality of and access to drinking water. These diseases are contracted when people drink or use polluted water to prepare food and handle kitchen and cooking utensils or, when due to a scarcity of water they cannot practice regular hygiene habits.

Most diseases are transmitted through vectors¹⁵ that breed in water and subsequently are introduced into the human body when a person drinks contaminated water or when it comes into contact with a person's skin. Some of the diseases are: parasitosis, rickets, poor physical growth, psychological and emotional disturbances. Serious cases may attack vital organs and result in death. The main tool available to prevent these diseases "that frequently affect the communities" is routine personal hygiene habits and the person's housing.

According to the WHO the following are the basic and essential requirements to guarantee the safety of drinking water: a **«framework » for water safety**, that involves goals such as the protection of health as determined by a competent authority in the field of health, **adequate and well managed systems** (adequate infrastructure, correct monitoring and effective planning and management), as well as an **independent surveillance system**.

The **safety framework** refers to the prevailing laws that govern the parameters of the quality of water, the classification of water and water treatment systems for household supply.

¹⁴ Guides for the quality of potable water. FIRST ANNEX OF THE THIRD EDITION. Volume 1. Recommendations. http://www.who.int/water_sanitation_health/dwg/gdwq3_es_full_lowres.pdf?ua=1 Friday 10/04/2015.

¹⁵ Vectors are the living organisms that transfer an infectious agent to a host of another.

Adequate **treatment systems** include¹⁶:

- Simplified treatment: chlorination and/or filtration
- Conventional treatment: coagulation, decanting, filtration and chlorination
- Special treatment: aside from all of the above, the application of ozone, filtration using activated carbon filtration or other treatments.

The **parameters used to evaluate** each type of water are:

- Fluctuating matter, even non-natural foam
- Oils and fats
- Substances that communicate taste and smell
- Substances forming obnoxious deposits to store objects
- Coliforms¹⁷
- Bio-chemical demand for oxygen (BDO)¹⁸
- Oxygen demand (OD)¹⁹
- Turbidity²⁰
- Artificial colours
- pH (or measure of acidity).

1.4.2 Water quality management model²¹

This **management model** proposed by the WHO/PAHO involves looking into: microbiological and operational aspects as well as chemical disinfection methods and chemical and radiological aspects with the aim of establishing the water's degree of acceptance. However it also highlights aspects that are related to safety management of drinking water. Therefore, it is recommended: **(i)** to define the responsibilities and functions of public health authorities and local authorities as concerns surveillance and quality control; **(ii)** to promote an integrated water resource management, including other sectors, and **(iii)** as a central element, to define the functions and duties of the drinking water supply

¹⁶ Basic sanitation handbook for governorships and municipalities (N°2 of the series Water Supply Systems). Joint MDG (PNUD, OPS/OMS/UNICEF/OIT) Programme. Asunción, Paraguay. 2012.

¹⁷ Human excrement contains a large amount of coliform organisms and its presence in water is considered as an evident index of fecal contamination (fecal coliforms) with pathogens and reflects the human intervention in this contamination process. (Basterrechea, 1984).

¹⁸ This parameter measures the amount of oxygen required for the microorganisms to establish the organic matter in aerobic conditions.

¹⁹ Dissolved oxygen. The concentration of dissolved oxygen is important for studies on the contamination of water systems due to the fact that living organisms depend upon oxygen to maintain the metabolic process that produces energy to grow and reproduce. (Basterrechea, 1997). The dissolved oxygen and the BDO produce values that reflect the eutrophication problem as a result of a strong load of organic matter that enters the water system. The eutrophication of an eco-system or environment is characterized by an abnormally high abundance of nutrients.

²⁰ Turbidity or turbidness refers to the lack of transparency of a liquid due to the presence of solid particles in suspension. The more solids in suspension in drinking water the higher its turbidity and the more cloudy or dirty it will be. Turbidity is considered as a good measure of the quality of water: the more the water is turbid, the lower its quality.

²¹ Guides for the quality of potable water. FIRST ANNEX TO THE THIRD EDITION. Volume 1. Recommendations. http://www.who.int/water_sanitation_health/dwg/gdwq3_es_full_lowres.pdf?ua=1 Friday 10/04/2015.

entities. This is undoubtedly a macro vision that covers all the institutions, localities and communities of users of a country.

As concerns **Community Management**, the WHO indicates that community managed drinking water supply systems (with or without piping) are frequently found in developed and developing countries alike. The concrete definition of a drinking water community supply system varies.

The management and operation of a community drinking water supply system basically depends upon the members of the community who often have not been adequately trained and sometimes do not charge for the service provided. The drinking water supply systems in peri-urban areas of developing countries may have characteristics that resemble those of rural community systems.

In order to ensure that the community management programmes for the quality of drinking water are effective and sustainable, the WHO and the ILO indicate that “local communities must participate in all the stages of these programmes: preliminary studies; decisions concerning the location of the wells; the location of the water extraction points or the creation of protected areas; monitoring and surveillance of the drinking water supply system; notifications in case of a breakdown; the conduction of maintenance routine inspections and the adoption of the corrective measures; as well as the provision of support activities, which includes sanitation and hygiene practices”.

The WHO indicates that some communities may be very organized and take measures on issues regarding health or the supply of drinking water, while others may not have an adequate drinking water supply system. The WHO also points out the case of community sectors, for instance women, who may be under-represented as well as potential disagreements or conflicts between factions. Therefore, it recommends that the authority in charge pay the visits, possibly over a period of several years, to support and encourage the communities and to check and see if the structures that have been created are still working.

The OMS/PAHO recommends that the responsible authority monitor, provide support and encouragement to communities for many years, in order to ensure that the established structures for adequate water management continue to operate

As concerns quality, hygiene and health education, programmes must be implemented in order to guarantee that the community:

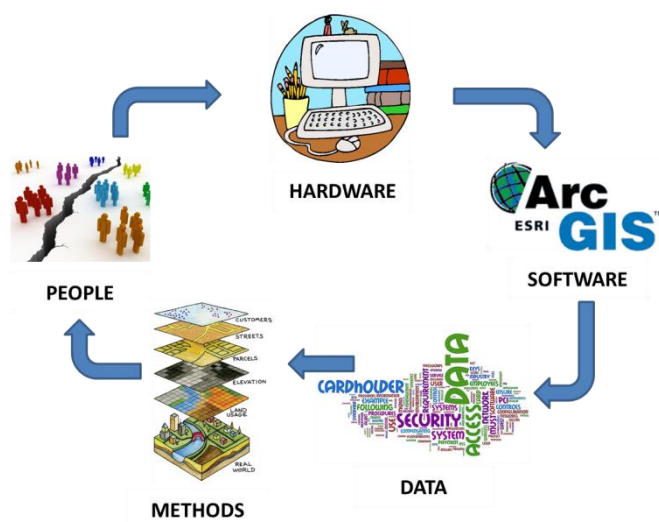
- Knows the importance of the quality of drinking water and its relationship to health, as well as the need to have sufficient drinking water for domestic use: to drink, cook and for hygiene;
- Recognises the importance of quality surveillance and has the necessary capacity to react and correct the bad quality;
- Understands the surveillance process and is prepared to enforce it;
- Has the necessary capacity to fulfil this function; and
- Knows the requirements concerning how to protect the supply of drinking water from contamination.

We wish to point out that for the purposes of the community planning-contracting process promoted by this series of guides, **it is extremely important that the team in charge of the planning be aware of the risks involved in the use of water unfit for drinking and also that adequate institutions are needed to implement the system in charge of controlling and surveilling how the W&S systems and solutions are functioning.**

1.5 Geographic Information Systems (GIS)

1.5.1 What are they?

In a broad sense, a Geographic Information System (GIS) is a tool that integrates and relates different components such as, users, hardware, software and processes used to organize, store, handle, analyse and model large amounts of data linked to a spatial reference.



Source: Pre-designed Word images

Preparation: by the author

In a strict sense, a Geographic Information System is an information system that can integrate, store, edit, analyse and share **geographically referenced data**.

These systems allow users to create interactive queries, analyse the spatial information, edit data, maps, and present the results of all these operations in a user-friendly manner. Thus, they facilitate the inclusion of social and cultural, economic and environmental aspects that result in more efficient decision making.

1.5.2 How do they work?

GIS works with an alpha-numerical data base containing geographic information linked to an identifier that is common to graphic objects on digital maps. In this manner, by pointing to an object, its attributes are immediately featured, and, inversely, by searching for a record of the data base, its location on the map shows up immediately.

GIS allow access to the database through a friendly way. Thus, by pointing to an object its attributes are featured and by searching for a record its geographical location can be known

GIS is mainly used to manage spatial information. The system can separate the information into different thematic layers and store them independently, thus allowing the data to be handled quickly and simply. This makes it easier to relate the existing information through the geo-spatial topography of the objects in order to generate new data that would be impossible to obtain otherwise.

1.5.3 What are they used for?

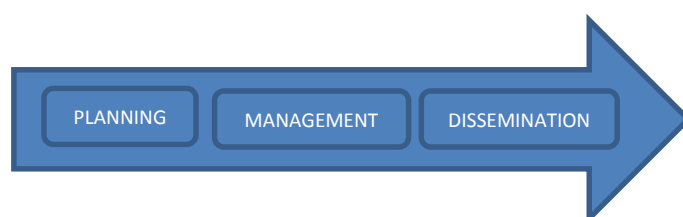
GIS technology may be used for scientific research, resource management, asset management, archeology, environmental impact assessment, urban planning, cartography, sociology, historic geography, marketing and logistics, just to name a few. For example, a GIS could enable emergency groups to easily calculate the response time in case of a natural disaster or, as regards water management, to discover water sources that should be protected against pollution, or those that can be used to set up new business and benefit from the advantages of an underdeveloped area that hardly has competition.

The main issues that a geographic information system can solve ordered from the simplest to the most complex are:

- **Location:** to ask about the characteristics of a given area
- **Condition:** the compliance or non-compliance of the conditions imposed on the system
- **Trend:** comparing different temporal or spatial situations of a characteristic
- **Routes:** calculation of the best route between two or more points
- **Patterns:** detection of spatial patterns
- **Models:** generation of models starting from the phenomenon or simulation models

1.5.4 Advantages of applying a GIS in enterprises

- The information is generated by the daily work process
- Quick and simple access to the cartography and data inserted
- Total adaptation to business requirements: data models, terminology, etc.
- Centralised information which generates more reliable data
- Standardised processes to include data from anywhere in the country
- Special consultations
- Efficient Access to information
- Higher overall productivity of work and support in decision making.



1.5.5 GIS applied to information management

A well designed Geographic Information System is an essential tool to obtain transparent information concerning the use of resources applied in the implementation of programmes in an effective and affordable manner. This would enable governments and other important stakeholders linked to the programmes, such as, signatory parties of agreements, donors, civil society, etc., to systematically calculate the efficiency of their interventions and thus be able to improve them.

Consequently, it is highly recommended that the programmes that have a national coverage invest in the review/re-design of user-friendly platforms that can be accessed through the internet (a system with several copies, accessible by user levels). These platforms must be integrated so that the entire process can be monitored from participant registration (including biometric data) up to monitoring and evaluating the results obtained with the support provided to the

programmes' recipients which covers the management of the implementation of sub-projects specific support initiatives.

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2 ILO METHODOLOGIES AND INSTRUMENTS THAT WILL BE USED

2.1 Integrated Rural Access Planning (IRAP)

2.1.1 Background of IRAP use²²

Integrated Rural Access Planning (IRAP) is a **territorial planning model that has multi-sectoral traits developed by the ILO** with the objective of helping rural communities and local authorities to identify the access problems and needs of these populations with regard to basic social and economic services and to determine the investment priorities required to satisfy them.

IRAP is based on the concept that **the lack of access of rural populations to goods and services is one of the fundamental restrictions to development**. There is considerable evidence that leads us to think that the lack of access to services is a factor that impedes integrating the rural population of a country into its economy and hampers this population's social wellbeing, which adversely affects the country's conditions of poverty and under-development.

The planning processes based on the IRAP methodology aims at defining the priorities of the rural population as concerns access to water, health, energy, inputs, as well as agricultural production, markets and transport services. For this purpose this method applies the **access indicator** as a main support element for decision making that must be done in participation with the communities involved.

Due to its simplicity, the IRAP is **a tool that can be easily managed and applied** because it adequately responds to the needs of the rural population and takes into account the capacities of local governments. The IRAP facilitates compiling and analysing information on the location (including the use of a GPS), the state and use of the infrastructure and rural services and also enables the participatory prioritization of public intervention needed in order to improve access to these services. In this sense, it aims at supplementing the investment programmes developed by sub-national governments as part of their management responsibilities.

By using IRAP, planners may identify and inhabitants may propose a series of well-defined interventions and subsequently determine the corresponding priorities.

²² Taken and adapted from: Integrated Rural Access Planning. Cartier, Serge (Editor). ILO. Lima, September, 2005

IRAP is a territorial planning model that has multi-sectoral traits used to identify and prioritise public investment projects and improve the provision of local services

IRAP was originally designed to be used by national government agencies that operate at a local level but are extensively used by local and provincial governments. It has also been used by development institutions that work at a local level and by policymakers, planners, engineers and people who work in social outreach who have recognized and appreciate this tool because it can have a positive impact on the planning and management of local investment and development processes.

2.1.2 Sectoral use of the IRAP in water and sanitation

Paraguay has conducted a sectoral adaptation of the IRAP particularly used in the Water and Sanitation sector as part of the United Nations Inter-Agency Programme to accomplish the Water & Sanitation millennium goals.

On this occasion a new adaptation was applied in the rural water sector including a watershed approach and coordinated management with the agricultural sector.

2.2 Community Contracting

2.2.1 Background on the application of a community contracting²³

Community Contracting (CC) is a modality to implement infrastructure and public service projects promoted by the ILO that aims at ensuring the participation of the beneficiary community in all the project's phases. CC encourages communities to adopt a decisive role in the identification, planning and implementation of development initiatives that tackle solving problems these communities face.

The community is in charge of implementing the project according to the procedures and funding agreements with the responsible State entity

²³ Taken and adapted from "Community Contracting" (Draft). ILO, Intensive Employment Investment Programme. Geneva, 2008

2.2.2 The Community Contract

Community contracting become a reality when a community contract is signed, that is, a legal contract between a contracting entity (local government, development programme, technical department of the State, etc.) and a community represented by a Committee.

The Community Contract is more than a mere means to fulfil the results of a project. It is also used to **build skills and abilities and to strengthen the community as an entity as well as its individual members**. It is a public private partnership among counterparts and not a conventional supplier-receiver relationship. As such it aims at reaching an agreement which is feasible and acceptable among the parties. It is a tool that fosters local governance, provides the community with a say and a way of participating in initiatives that have an impact on its development.

Community contracting is also used to build skills and abilities and to strengthen the community as an entity as well as its individual members
Thus, human and social capital of the community are enhanced

This approach represents a major change in the predominant development paradigm in which NGOs and the private sector generally play a more direct role in project implementation, while **in this case it highlights the executive role of the community**. It is very important that the **communities define the needs, do the works and manage the funds under the supervision of the local authorities**. The communities become more trustworthy and skilful in organizing and negotiating and this helps them in dealing with local authorities or other external partners.

This approach has been proven to be successfully applied in several countries due to the quality of the goods created and the feeling of ownership resulting from the empowerment process. This intervention modality creates a solid basis for future arrangements as concerns the operation and maintenance of the assets created.

Community contracting allows the strengthening of collective capacities and the creation of a sense of community ownership towards the works done
This establishes the foundations for a sustainable procedure, maintenance and management

2.3 Community contracting linked to IRAP

As part of the IRAP application strategy in Paraguay, the planning process was conceived not only as a tool for decision making but also as an essential part of the empowerment process of the benefitted communities as regards the sustainable management of water systems that these communities will be in charge of and manage.

Furthermore, this is a process with indigenous communities in which both processes (planning and community contracting) are linked to the recommendations of Convention N° 169 concerning a consultation with Indigenous People.

In this guide IRAP is presented as a tool for decision making and as an essential part of the empowerment process of communities, particularly in the case of indigenous people

2.4 ILO Convention N° 169²⁴

ILO Convention N° 169 is a legally binding international instrument that specifically deals with the right of indigenous and tribal peoples. Up to date this Convention has been ratified by 20 countries. Once a country ratifies the Convention, there is a one year period to align the legislation, policies and programmes before it eventually becomes legally binding. Countries that have ratified the Convention are subject to ILO supervision as concerns its implementation.

Convention N° 169 is founded on the following basic principles:

- **Identification of indigenous and tribal peoples.** The Convention does not define who the indigenous and tribal peoples are but rather provides the criterion to describe the people that it intends to protect. The fundamental criteria used to identify indigenous and tribal peoples is self-identification, aside from their traditional life styles, social organization, customs and own laws.
- **Non-discrimination.** By recognizing that indigenous and tribal peoples are often victims of discrimination in several areas, the first general and fundamental principle of Convention N° 169 is non-discrimination. This

²⁴ Convention N° 169 on Indigenous and Tribal People <http://www.ilo.org/indigenous/Conventions/no169/lang-es/index.htm>

criterion covers non-discriminatory relations concerning women of the communities.

- **Special measures.** As a response to the vulnerable situation of indigenous and tribal peoples the Convention specifies that special measures shall be adopted as appropriate to safeguard individuals, institutions, property, labour, cultures and the environment of the peoples concerned. Furthermore, it mentions that such special measures shall not be contrary to the freely-expressed wishes of the peoples concerned.
- **Recognition of the culture and other specific characteristics of indigenous and tribal peoples.**
- The cultures and identities of indigenous and tribal peoples are an integrated part of their lives. Their way of living, customs and traditions, institutions, and customary law, modes of using the land and how their society is organized are usually different to those of the dominant population. The Convention recognizes these differences and aims at guaranteeing that these be respected and taken into account when decisions are taken that will undoubtedly have an impact these people.
- **Consultation and engagement.** The spirit of consultation and engagement are the cornerstone of Convention N° 169 upon which all its provisions are based. **The Convention demands that indigenous and tribal peoples be consulted whenever dealing with issues that affect them. It also demands that these people freely participate, be well and openly informed prior to a development process and the formulation of policies that affect them directly.**

The principles of consultation and engagement set forth in Convention N°169 relate not only to specific development projects but also to broader issues of governance and participation of indigenous and tribal peoples in public life

- **The right to decide development priorities.** Convention N° 169 specifies that indigenous and tribal peoples have the right to “decide their own development priorities since they affect their lives, beliefs, institutions and spiritual well-being and the lands they occupy **or otherwise use, and can exercise control over their own economic, social and cultural development**”. This has been interpreted by the ILO supervisory entities as a fundamental consideration when consultations are being carried out with indigenous people.

- **Implementation of Convention N° 169.** Since Convention N° 169 was adopted it has gained recognition beyond the countries that have ratified it. Its provisions have borne an influence on a number of documents on policies and legal rulings at a regional and international level, as well as on national policies and laws. The provisions of Convention N° 169 are compatible with the provisions of the UN Declaration on the Rights of Indigenous People.

Convention 169 is an instrument that encourages dialogue between governments and indigenous and tribal peoples and has been used as a tool for development, prevention and conflict resolution processes

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3 IRAP ADAPTATION TO THE RURAL WATER AND SANITATION SECTOR²⁵

This chapter presents the IRAP adaptation process to the W&S sector especially as concerns the use of the original model's access indicator that **in this case has been broadened to include the application of a multiple factor matrix**. The application developed in Paraguay is presented by way of example.

The content has been developed to enable users to understand the methodology applied to determine the prioritisation indicators. In this manner, users may determine their own prioritisation indicators, basically taking into account the W&S sector policies that prevail in their country. However, we must remember that the main limitation to formulate indicators is the availability of information.

The users of this guide can establish their own prioritization indicators, taking into account the W&S sector policies in their country and the methodologies set out below

3.1 The IRAP Access Indicator

The ILO designed the IRAP methodology to be applied in multiple sectors based on an analysis of the Access Indicator.

The access indicator is an easily applicable mathematical tool aimed at establishing the degree of the impact on several pre-selected communities to be submitted to a prioritization process due to the lack or difficulty of having access to a service.

This is why **the Population Volume (Number of Inhabitants) of a community affected by the service is multiplied by the average time it takes an inhabitant to have access to the service**.

Its mathematical expression is simple:

Access Indicator = Population Volume x time travel it takes to obtain the service/

IA = N° of inhabitants (or families) x average minutes of the time travel

²⁵ Salomón, Emilio. Integrated Rural Access Planning in Water and Sanitation. Application Handbook. Joint Programme "Building Skills to Define and Apply a Water and Sanitation Policy. UND, PAHO-WHO, UNICEF, ILO. Asunción, December, 2012.

This is how the largest number of inhabitants who take more time to have access to a service is calculated. **It is expressed in the minutes accumulated.**

The value resulting for each community can be compared to the values obtained for other communities that were submitted to the prioritization and therefore we can determine how the priority ranks overall.

3.1 Application of the Access Indicator for sectoral prioritisation

Since the IRAP is a multiple sector planning tool, **this indicator is applied to each of the sectors analysed**, such as: health, education, water and sanitation, access to markets, to the local loading and passenger land terminals, etc.

The access indicator measures “the size of the demand” of different communities in a given area for each service. The relative values obtained allow us to compare the communities analysed according to their greatest difficulty to access a given service. Thus we can define the order of priority to invest in that service. **Chart 1** provides an example:

Chart 1: Example of how to use the Access Indicator to determine the priority to attend several communities concerning a specific service

Community name	Nº of Inhabitants	Access time to the service (in minutes)	Access Indicator (Inhabitants x time to have access)	Order of priority for attention
A	250	20	5.000	2
B	60	35	2.100	5
C	180	50	9.000	1
D	300	10	3.000	4
E	350	0	0	Not needed
F	75	60	4.500	3

According to the results, the first priority of attention is Community C since it has the highest access indicator. This is because despite the fact that it is the community that has a relatively low population it nonetheless ranks second as concerns the time it takes to obtain the service.

According to that same criteria, Communities A, F, D and B follow in order of priorities. Pay attention to the case of Community E that has a “zero” and this indicates that the community has a service within its locality, that is, that all the

members of the community have access to this service. However this does not indicate if the quality of the service (water) is adequate or not. Moreover, as concerns Community F, despite having the highest travel time to access this service, it has been assigned a relatively modest priority since it does not have a large population.

This observation (the communities most in need who are excluded because either they have few inhabitants or ignore the quality of the water they get), has been considered as a determining factor for the prioritisation, and has led us to consider the need to recommend that the communities be prioritised by applying a matrix that takes into account other supplementary indicators.

3.2 Adaptation of the IRAP Access Indicator to be used in a W&S sectoral prioritisation matrix

The IRAP basic indicators (population and time) were separately divided to be used as matrix indicators. For this purpose, they were separately redefined as coverage and access indicators as explained below:

1. **Coverage indicator: Measures the population volume affected by the service** from the pre-selected communities that have been included in the prioritisation process. The measurement unit is the **number of people** and therefore this indicator will measure the extension or size of the deficiency.

This indicator is used as a direct indicator (+/+), that is, the **larger population affected is given a higher priority.**

Access indicator: This refers to the **travel time to access a service**, in this case to potable water sources. This indicator measures the **difficulty of people of the community to have access to the service.** It is expressed in minutes. It is obtained from the survey that will be applied as part of the planning process.

It is a Direct Indicator (+/+) that gives a **higher priority to the community that needs more time to reach the water source.**

3.3 The use of additional indicators

Since the need to use Supplementary Indicators had been recognised, the ILO team recommended the following uses to the consulting firm:

2. **Incidence indicator: Measures the incidence of diarrheic diseases in the population.** It is expressed by the **percentage of people of the community affected by this type of disease in the last year.** This indicates how deep the

incidence that produced an absence (or deficiency) of the service was in the community. It is expressed in X per cent (%) or X per thousand (‰). The information obtained from the interview with qualified informers such as the health post will be applied to the inhabitants and will introduce adequate questions:

This is a Direct Indicator (+/+) that **gives a higher priority to the community with the highest incidence of diarrheic diseases**. In this case, estimated near-to-reality percentage values have been taken of the indigenous communities of El Chaco.

3. **Technical indicator:** This refers to the **measurement of the degree of contamination in wells, water systems and the groundwater**. This is an indicator that effectively measures and therefore is considered to be “objective”, that is, not dependent upon any type of subjectivity. In order to obtain this indicator, the responsible authority must complete a specific work, in this case SENASA, by including in its intervention procedures the **Rapid Water Quality Evaluation (RWQE)** as used by PAHO in the Joint Programme.

The indicator is direct (+/+), that is, it **assigns a higher priority to a community with a higher level of contaminated drinking water**. In order to be included in the Prioritisation Matrix, the values obtained through RWQE may be used directly or be simplified by qualifying the degree of contamination into ranks: high, medium and low as has been decided for this simulation model.

3.4 Multiple factor matrix for the sectoral prioritisation in Water and Sanitation

With this set of indicators and by using a matrix we can obtain a much more reliable prioritization model to define the order of priority in which the pre-selected communities will be intervened.

Table 2: The prioritisation matrix by W&S indicators contains a basic scheme of how the matrix is applied. Next to the **absolute values of each indicator** is a series of **relative values** (yellow shaded field) there is a parallel column with **relative values** (pink shaded field) that will be used to standardize values that have been measured with different units (N° of people, minutes, percentages, high, medium and low weighted averages).

To obtain relative values, each of the absolute values of a same column are divided by its highest value.

In this manner, by adding the relative values (standardised) of the pink shaded column a standard comparison value can be obtained.

Table 2: Prioritization matrix of communities by W&S indicators: AEÍ Municipality

COMMUNITY	A		B		C		D		E	F
	Coverage (N° of people affected by the service)		Access (Minutes)		Incidence of diarrheic diseases (%)		Degree of contamination of the wells and systems (High, Medium, Low)		Comparison Value $\Sigma(VR) A$ – D	Order of Priority
	AV	RV	AV	RV	AV	RV	AV	RV	CV	Priority
A	250	0,71	20	0,33	70	1,00	3	1,00	3,04	1
B	60	0,17	35	0,58	20	0,29	2	0,67	1,71	4
C	180	0,14	50	0,83	25	0,36	1	0,33	1,66	5
D	300	0,85	10	0,17	45	0,64	3	1,00	2,66	2
E	350	1,00	0	0,00	1	0,01	0	0,00	1,01	6
F	75	0,21	60	1,00	25	0,36	1	0,33	1,90	3

AV = Absolute Value. Obtained by the direct measurement of each community to be prioritised.

RV = Relative Value. Obtained by dividing the absolute value of each column between its highest values.

CV = Comparison Value. Obtained by adding the relative value of one same community (a horizontal addition).

Priority = The order of priority is given by the highest relative value as concerns comparison.

In this simulation model the first priority is given to **Community A** because it has the highest comparison value (3.04) and concentrates the highest percentage of diarrheic diseases and the highest level of contamination of its water system.

Community D has been given the second priority because it has the second highest comparison value (2.66) and the highest degree of contamination of its water system aside from having a larger population.

The third priority has been assigned to **Community F** because it has the next highest comparison value (1.90) and the highest travel time to access the community's service although the other factors present low levels of incidence.

These are followed by **Community B** (1.71) and **Community C** (1.66) that have lower levels of incidence in all the factors. Then there is finally **Community E** (1.01) which despite having a larger population volume has a water service (the travel time in this case is zero), and this water service is not contaminated. (assigned zero value).

3.5 Results of the first application of the IRAP in W&S in Paraguay, development of knowledge and management capacity indicators

The consulting firm that first applied the IRAP for the Joint Programme mentioned that it had had **difficulties in obtaining the incidence and contamination indicators of wells and water system**. Therefore, this firm recommended that other indicators be included in order to better classify the communities and rank them by priorities.

The recommended indicators were:

- (i) **Degree of knowledge** of the community regarding the importance of potable water and sanitation in order to conserve health; and,
- (ii) **Management capacity** of the communities to self-manage the systems to be built and that will be given to them to be managed.

These indicators were not developed by the consulting firm and are presented further below within the simulation model described herein for strictly didactic purposes:

Knowledge indicator: Measures the degree of knowledge of a community concerning the importance of potable water and sanitation for the conservation of health. For this purpose qualifications are delivered by applying High, Medium and Low scores according to the **degree of performance**. To obtain the information adequate questions must be included in the

questionnaire to be applied as part of the data collection process. After these qualifications are numerically weighted they are scored, for instance, from 1 to 3.

A very important technical explanation must be provided since this indicator may be used as a direct or reverse indicator, depending upon the programme's political orientation or the responsible entity (SENASA):

It will be applied as a **direct indicator (+/+)** if a community has a greater management capacity and is given a higher priority. In this case, the **higher level of efficiency is rewarded** since this factor will favour the Project's future sustainability.

It will be applied **as a reverse indicator (-/+)** if a community has a lower management capacity and has been assigned a higher priority. In this case the indicator will represent the application of a **promotional policy** which means that the programme will assume **the challenge of improving the level of the least efficient communities** that are usually the poorest. This policy is consistent with the principles of the programme that aim at benefitting the least favourable communities. However, to enable the Competent Authority to apply this programme we will have to verify if it is in line with its institutional policies. If there is no such policy, a direct indicator will be applied (+/+).

Chart 3: Application of the qualifications obtained through the training item, the type of application as a direct or indirect indicator will be presented.

As has been explained in the case of [Chart 2](#), **absolute values must be converted into relative values** in order to compare the magnitudes against different measurement units.

In the case of the column that represents the use as a direct indicator, each value of the column of absolute values (yellow shaded) is divided into the highest value of that same column.

If the indicator is used reversely, the lowest value of the column of absolute values (yellow shaded) is divided by each value in that same column, as shown in Chart 3.

Chart 3: Application of the qualifications obtained under the training item, as a direct and reverse indicator.

Qualification obtained by applying evaluation factors (Qualification)	Quantification (Absolute Value)	Application as a direct indicator (Relative Value)	Application as a reverse indicator (Relative Value)
Low	1	0,33	1,00
Medium	2	0,67	0,50
High	3	1,00	0,33

Each number is divided by the highest of the column

The lowest number is divided by each number of the column.

When used as a reverse indicator, when the lowest absolute value is achieved through this procedure, the higher the absolute value, **accomplishing the purpose of giving the least trained communities the highest priority**, making the alleged promotional policy true (or the existing policy whichever the case, if enacted in due time).

As has been pointed out, **the basic data for qualification must be obtained from the survey or by interviewing qualified interlocutors**. Annex 1 develops the criteria that can be applied to reach the suggested qualification. The survey must also be used to **obtain qualitative information** that helps to define the programme's training content as a mechanism to ensure the system's sustainability. For this purpose the corresponding questionnaire must consider questions concerning the appropriate data aiming at the medium and long term.

It must be noted that the qualification of 1 to 3 is arbitrary; however, the qualification range may be broadened to 1 to 5 for example. In these cases there will be a "greater" distinction among the different communities. In the simulation model this situation is developed by applying the next indicator.

Management capacity indicator: This indicator aims at measuring the communities' management capacity with regard to their independent administration of the systems built which they will receive and manage.

As in the former case, the qualification of the management capacity will be done based on specific questions that must be included in the questionnaire to be used in surveys or interviews of qualified individuals as part of the planning process. **Annex 2** contains this development.

In a similar manner and with the same considerations explained on the knowledge indicator, the values obtained are expressed in weighted figures, as follows:

Chart 4: Application of the qualifications obtained under the item of management capacity, as a direct or reverse indicator

Qualification obtained by the application of evaluation factors (Qualitative)	Quantification (Absolute Value)	Application as a direct indicator (Relative Value)	Application as a reverse indicator (Relative Value)
Low	1	0,20	1,00
Medium Low	2	0,40	0,50
Medium	3	0,60	0,33
Medium High	4	0,80	0,25
High	5	1,00	0,20

Each number is divided by the highest value of the column

The lowest number is divided by each number of the same column.

3.6 Application of knowledge indicators and management capacity in the Matrix

Reverse indicators are the main objectives to be developed in addition to the fact that the application of broader qualification ranges fulfils merely didactic purposes; and, we reiterate that **Annexes 1 and 2 contain the qualification criteria developed as examples** and also mention that the data collection must result in the application of the survey or interview with qualified informers.

On the other hand, if the recommendation of the consulting firm has been taken into account, the prioritisation matrix should substitute the values of columns C and D of **Chart 2** by the values found in **Charts 3 and 4**.

However, in the simulation model developed here we have preferred maintaining these columns and adding those developed in **Charts 3 and 4** in order to present a more complex Matrix that consequently can define the priorities given to the communities that have been analysed with a greater precision. The reasoning is that **the larger the number of qualification criteria used, the less certain the results**.

However **the authority in charge of implementing these criteria defines which will and will not be applied, bearing in mind the effective possibility of obtaining adequate information** and also the degree of familiarity that the promoters in charge of their application will acquire as concerns the management of this tool in addition to the survey and interviews with qualified informers.

The decision on the prioritization of indicators is responsibility of the authority in charge

This decision depends on the information that can be obtained and the degree of familiarity that the Planning Team has with managing the matrix

Chart 5 on the next page contains the complete Matrix with the criteria that has been explained. There you can observe that the prioritization has undergone substantial modifications because the degree of knowledge and the management capacities vary considerably from one community to the next.

The observations of these variations leads us to propose as a final question if it is not necessary to **weigh the factors** giving more weight to some, as considered adequate depending upon the reality of the municipality analysed or the policy to be implemented.

These matters must be dealt with in a decisive manner by the entity in charge of implementing the IRAP and the prioritization of the communities. In the case of Paraguay initially the Joint Programme Management Committee, later known as SENASA, adopted this tool to decide which communities of one same municipality must be intervention priorities.

5: Matrix for the prioritisation of communities by W&S indicators, AEI Municipality

(in priority order)

COMMUNITY	A		B		C		D		E		F		G	H
	Coverage (in N° of people affected by the service)		Distance (in minutes)		Incidence of diarrheic diseases (in %)		Degree of contamination of wells and systems (High, medium, low)		Knowledge on W&S (Score 1- 3 Reverse)(*)		Management capacity (Score 1-5)		Comparison Value (Σ A – F)	Order of priority
	AV	RV	AV	RV	AV	RV	AV	RV	AV	RV	AV	RV	CV	Priority
A	250	0.71	20	0,33	70	1.00	3	1,00	3	0,33	4	0,80	4.17	1
D	300	0,85	10	0,17	45	0,64	3	1.00	2	0,50	5	1,00	4.16	2
C	180	0,14	50	0,83	25	0,36	1	0,33	1	1,00	5	1,00	3.66	3
B	60	0.17	35	0,58	20	0,29	2	0,67	2	0,50	3	0,60	2.81	4
F	75	0,21	60	1,00	25	0,36	1	0,33	3	0,33	1	0,20	2.43	5
E	350	1.00	0	0,00	1	0,01	0	0,00	1	1,00	2	0,40	2.41	6

AV = Absolute Value. Achieved by the direct measurement in each community to be prioritised.

RV = Relative Value. Achieved by dividing the absolute value of each column by the highest value of that column.

VC = Comparison Value. Achieved by adding the relative values of one same community (horizontal sum).

Priority = The order of priority is given by the highest relation comparison value.

(*) = The application of the knowledge indicator as a reverse indicator implies the adoption of a management training policy for the least prepared communities.

3.7 Exercise to apply the Prioritisation Matrix for investment decisions on a group of communities

The purpose of this chapter is to do an exercise on the application of the Prioritisation Matrix developed in **Chart 5**.

The idea is that on the basis of the prioritization discovered, the following investment factors be analysed for decision making purposes.

In this case the following data is used:

Data:

1. An investment cost of US \$ 5.000 has been estimated by family unit (US\$ 2.000 for water and US \$ 3.000 for sanitation).
2. It is estimated that there are 5 people per family unit.
3. The communities analysed, with the exception of community F, do not have water or sanitation services or only have partial services.
4. Community F requires **repairs** of the water system for US \$ 15.000 and US \$ 100.000 for sanitation.
5. The budgetary amount available to finance this municipality is equivalent to US \$ 350,000 for the next budgetary year.
6. This amount could be repeated over the next years.

Chart 6: Calculated investment values for pre-selected and prioritised communities

COMMUNITY	G	H	I	J	K
	Comparison Value ($\Sigma A - F$)	Order of Priority of the Intervention	Investment amount for water	Investment amount for sanitation	TOTAL Investment amount
	VC	Priority	(in US \$)	(in US \$)	(in US \$)
A	4,17	1	100.000	150.000	250.000
D	4,16	2	24.000	36.000	60.000
C	3,66	3	72.000	108.000	180.000
B	2,81	4	120.000	180.000	300.000
F	2,43	5	15.000	100.000	115.000
E	2,41	6	30.000	45.000	75.000
		TOTAL	361.000	619.000	980.000

Questions:

1. How many years will it take to attend the total needs of this municipality if the available investment is an average of US \$ 350.000 per year?
2. What investment decisions would you recommend the decision making entity to take?

Answers:

1. If the total investment required is US \$ 980.000 and the annual availability is US \$ 350.000, a simple division reveals that the term required to attend the demands of all the communities would be $US \$ 980.000 / US \$ 350.000 = 2,8$ years, that is three budgetary years.

US \$ 350.000 will be invested in the first two budgetary years and US \$ 280.000 in constant values in the third year.

In order to furnish recommendations to the decision making entity, the analyst must know the prevailing policies in the municipality or investing institution. Hence:

- If the policy establishes the need to satisfy the demand for water as the top priority and sanitation investments as the second priority, the first year the totality of the demand for investments in water of all the qualified communities can be attended, with the exception of Community F which only requires repairs. The sum of US \$ 346.000 is for the new investments in water. This indicates that the available balance of US\$4,000 could be used for the repairs of Community F.
 - But if the policy defines repairs as the first priority, the first expense of US\$15,000 would have to be used first in Community F, and therefore the available balance would be US \$ 335.000. This balance would be enough to cover the investment needs in water of the other communities, but not the last priority that is Community E, which sum up US \$ 316.000. Thus we would only have US \$ 19.000 to address its needs.
2. If the policy were to address water and sanitation as one same priority, in this case US \$ 350.000 would be available and enough to cover the needs of the first two priorities for the amount of US \$ 310.000. The balance of US \$ 40.000 is not enough to cover the third priority for the amount of US \$ 180.000. Nor would it be enough if we would want to cover only water for the amount of US \$ 72.000. In an elastic application of this policy the balance could be used to cover the repairs in water of Community F (US \$ 15.000) and 83 % of the US \$ 30.000 needed in water of Community E, considering that it has the largest affected community. If the policy is applied strictly the balance would not be used.

3. Should the Responsible Entity not have policies, this analysis could be used to propose the adoption of some of these.

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