CEDRIG CLIMATE, ENVIRONMENT AND DISASTER RISK REDUCTION INTEGRATION GUIDANCE

CEDRIG Operativo

Construction of a water treatment plant and sewer system for the Guaqui town, Department of La Paz / Municipality of Guaqui

Roberto Méndez, Daniel Maselli

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CEDRIG es una herramienta desarrollada y ofrecida por

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Agencia Suiza para el Desarrollo y la Cooperación COSUDE

Resumen

Información general

Contributors
Roberto Méndez, COSUDE-Ayuda Humanitaria, Bolivia
Daniel Maselli, Swiss Agency for Development and Cooperation SDC, Suiza
Moritz Krüger, Swiss Agency for Development and Cooperation (SDC), Tailandia
Michael Fink, Swisscontact
Tobias Sommer, SDC, Suiza
GENTIANE SCHWARZER, SDC - DRR Network, Suiza
nadia benani, SDC, Suiza

Objetivo general
Improve the current living conditions of Guaqui´s inhabitants through the implementation of an appropriate sewage system, benefiting the overall population

País
Bolivia

Presupuesto
Bs. 7'000'000 (approximately USD 1'000'000)

Duración
September 2016 - July 2017 (approximately 10 months)

Resumen

Descripción
Due to the absence of a sewage treatment plant in the Guaqui town, wastewater is discharged directly to Lake Titicaca, causing serious water pollution. Through the construction of a sewage treatment plant, the water pollution will be reduced along with an improvement of the living conditions of the local population. As a result of frequent lake level flucuations, however, the sewage treatment plant might suffer negative impacts from flooding. In addition, frosts during the cold winter months can affect the plant's components such as (i) the sewage collection system and inspection chambers, (ii) emissary, (iii) pumping chamber, (iv) pressure pipe, (v) treatment plant, and (vi) infiltration ditches.

Términos clave
Wastewater treatment system
sewage collection system
emissary
water pumps
lake contamination
Bolivia
Floods
frosts

Sectores de Intervención

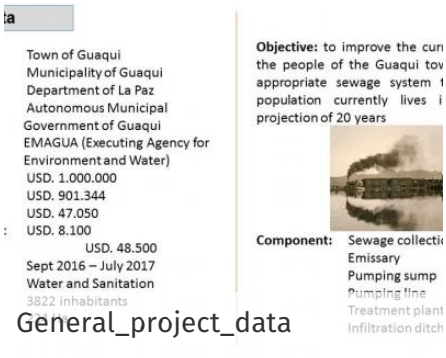
Salud
Agua y saneamiento
Turismo

Documentos

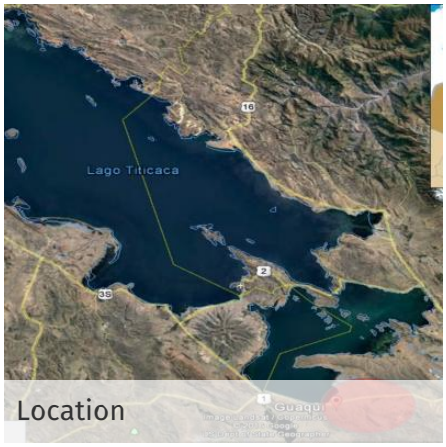
Project Information (pdf, 5.24 MB)

Imágenes

Project_Location

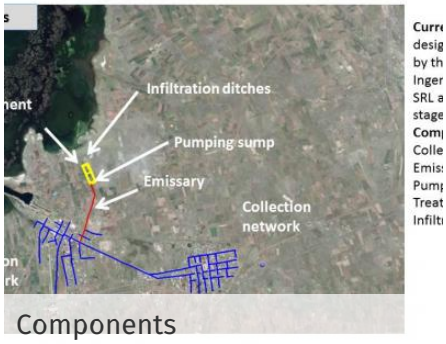


General_project_data



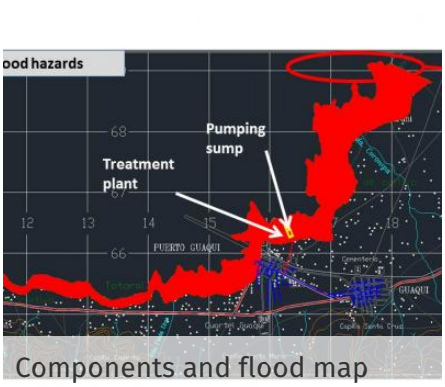
Location

Coverage and extension

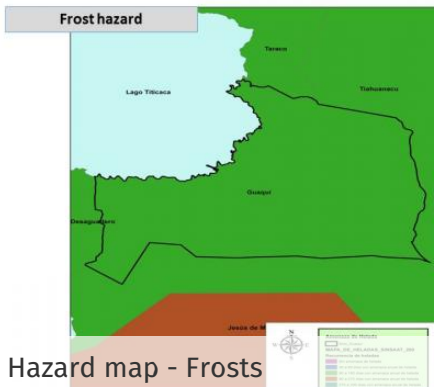


Components

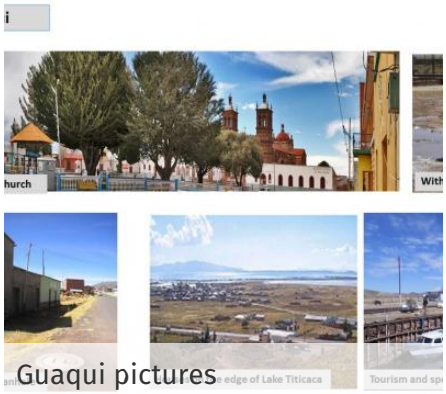
Flood map



Components and flood map



Hazard map - Frosts



Guaqui pictures

Infrastructure

Infrastructure

Infrastructure

Infrastructure

Perspectiva del riesgo

Amenazas naturales (hidrometeorológicas y geológicas)

Nombre de la amenaza: Crecidas repentinas, inundaciones

Consecuencia: **Due to extreme lake level fluctuations, the plant's components could be damaged and filled with sediments. The service would be interrupted. This happens in average every 15 years.**

> Riesgo seleccionado	Grado	Probabilidad	Importancia
	Sumamente perjudicial	Probable	Riesgo alto

Vulnerabilidades: Disconnected communities, increased pressure on soils and water resources, fragile incomes, relationship between municipality and Risk Management Unit, additional health risks

Posible medida

Capacity building in DRR for local communities

Puntuación (opcional) 3.40

Comentarios The local community has no experience in DRR and should be included in the steering mechanisms (social control)

> Medida seleccionada

Posible medida

Strengthen operation and maintainance

Puntuación (opcional) 3.20

Comentarios DRR-related aspects were not considered for plant's operation and management

> Medida seleccionada

Posible medida

Early warning system

Puntuación (opcional) 2.00

Comentarios It is vital to observe the lake level fluctuations as well as the river discharge

> Medida seleccionada

Posible medida

It is vital to observe the lake level fluctuations as well as the river discharge

Puntuación (opcional) 2.20

Comentarios Dykes to protect the plant's components

> Medida seleccionada

Posible medida

Reduction of river discharge (river deviation)

Puntuación (opcional) 1.60

Comentarios Consider structural measures that permit the diversion of inflowing river water

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Consecuencia

Due to flood events, the equipment can not be used and/or broken parts have to be replaced

> Riesgo seleccionado	Grado	Probabilidad	Importancia
	Sumamente perjudicial	Probable	Riesgo alto

Vulnerabilidades

Skills: weak technical knowledge, replacement of spare parts, unsufficient access to credits and insurance solutions, lack of ownership of the municipality, emerging local markets and trade

Posible medida

Use of water-resistant, robust equipment

Puntuación (opcional) 1.80

Comentarios Consider extreme events

> Medida seleccionada

Posible medida

Risk transfer measures (insurance solutions)

Puntuación (opcional) 2.20

Comentarios Taking into account the socio-economic situation of the municipality and the local population, a insurance solution could be appropriate

> Medida seleccionada

Consecuencia

During a flood event, the wastewater could contaminate the river water and cause health problems for the local population. Due to the topography, contaminated water would flow into the lake and not to the urban zone.

Grado	Probabilidad	Importancia
Ligeramente perjudicial	Probable	Riesgo bajo

Vulnerabilidades

Health: health education, social hygiene, health stations, health networks, unprotected water sources, precarious health situation

Nombre de la amenaza: Frío extremo

Consecuencia: **Malfunction of the plant and drastic efficiency reduction of the oxidation basins. 90 to 180 days per year with frosts, 3835m a.s.l., average temperatures of 4°C , minimum temperatures -10°C (on average every 2 years)**

> Riesgo seleccionado	Grado	Probabilidad	Importancia
	Perjudicial	Probable	Riesgo medio

Vulnerabilidades: Operation and efficiency: communities with respiratory infections, lack of maintainance, low technical capacity, frequent interruption of service

Posible medida: **Change to appropriate materials**
Puntuación (opcional) 2.40
Comentarios Identify materials that support extreme cold temperatures
> Medida seleccionada

Posible medida: **Heating system**
Puntuación (opcional) 1.40
Comentarios Identify a technical solution that allows the plant's operation within the material's optimal temperature range (e.g. heating system)

Adapte su proyecto

Multi-criteria analysis of identified measures (xlsx, 13.04 KB)
Adapted Logical Framework (in Spanish) (pdf, 59.96 KB)

Perspectiva del impacto

Impacto negativo en el medioambiente

Componente del proyecto	Water treatment plant (oxidation basins) and pumping chamber
Posible impacto negativo	Bad odors could disturb the surrounding population
Importancia	Worsening of the quality of life for the local population and related health issues **> Impacto seleccionado**
Posible medida	**Artificial cover of the oxidation basins** Puntuación (opcional) 2.00 Comentarios Prevents odor emissions **> Medida seleccionada**

Componente del proyecto	Location of the water treatment plant
Posible impacto negativo	Landscape changes due to the different construction sites
Importancia	The water treatment plant could have an negative impact on the number of tourists visiting the Lake Titicaca region **> Impacto seleccionado**
Posible medida	**Land use plan** Puntuación (opcional) 3.60 Comentarios The water treatment plant can be included in the plan as an element which improves the quality of stay for tourists **> Medida seleccionada**
Posible medida	**Change of technology** Puntuación (opcional) 1.20 Comentarios It would mean substantial changes in the design of the project

Posible impacto negativo: The system will require large areas for construction

Importancia: The project could have an negative influence on local environmental planning and increase the need for additional human ressources of the Guaqui Municipality

Impacto negativo en los riesgos de desastres

Componente del proyecto: **Water treatment plant (oxidation basins)**

Posible impacto negativo: New settlements around the plant in the future

Importancia: Structural measures to protect the plant (e.g. through dams) could attract people and lead to new settlements in flood-prone areas

> Impacto seleccionado

Posible medida: **Security strips**

Puntuación (opcional) 3.20

Comentarios To be included in the territorial plans

> Medida seleccionada

Posible medida: **Purchase of land in surroundings**

Puntuación (opcional) 1.20

Comentarios Acquisition of land to avoid new settlements in flood-prone areas

Posible impacto negativo: Exposure of the Guaqui´s local population to greater risks from natural hazards and increase of vulnerability

Importancia: The planned structural protection measures could lead of a shift of risks more towards the urban areas. Scientific studies estimate a medium risk for this development.

Impacto negativo en el cambio climático

Componente del proyecto: **Water treatment plant (oxidation basins)**

Posible impacto negativo: Greenhouse gas emissions from the oxidation basins

Importancia: Taking into account the seize of the water treatment plant, high levels of GHG emissions can be expected. Even higher emissions are possible during a malfunction of the system

> Impacto seleccionado

Posible medida: **Artificial cover of the oxidation basins**

Puntuación (opcional) 2.20

Comentarios Storage of gases and burning with appropriate technology

> Medida seleccionada

Posible medida: **Carbon sinks (afforestation)**

Puntuación (opcional) 1.20

Comentarios Reforestation to compensate for GHG emissions

Posible impacto negativo: Emission of additional other gases by the water treatment system

Importancia: According to studies, the risk of problems arising from additional gas emissions is low in our stuy area.

Componente del proyecto: Power systems of the plant

Posible impacto negativo: The generators of the different pumping systems run with diesel causing high emissions of GHG and black carbon

Importancia: Taking into account the plant's increasing utlization (close to its limits), the pumping hours will increase in the future along with emissions of GHG and black carbon

> Impacto seleccionado

Posible medida: **Use of alternative energies, energy generation through burning trapped gases from the oxidation basins**

Puntuación (opcional) 1.60

Comentarios Strong winds in the study area (high potential for wind energy), and solar power

> Medida seleccionada

Posible medida

Connection to the national power supply system

Puntuación (opcional) 1.20

Comentarios This measure would imply the installation power supply lines over long distances

Adapte su proyecto

Adapted Logical Framework of the project (pdf, 58 KB)

Multi-criteria analysis of identified measures (xlsx, 13.04 KB)