CEDRIG CLIMATE, ENVIRONMENT AND DISASTER RISK REDUCTION INTEGRATION GUIDANCE

CEDRIG Opérationnel

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

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Direction du développement et de la coopération DDC

Vue d'ensemble

Informations Générales

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

Pays
Bolivie

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

Durée de l'activité
September 2016 - July 2017 (approximately 10 months)

Sommaire

Description
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.

Termes clés

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

Secteurs d'intervention

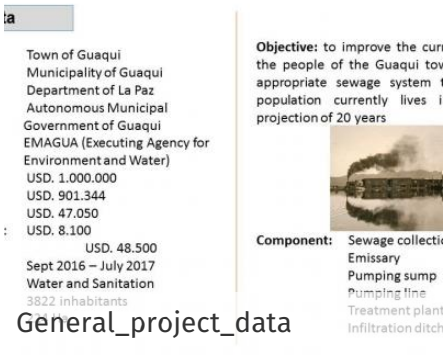
Santé
Eau et assainissement
Tourisme

Documents

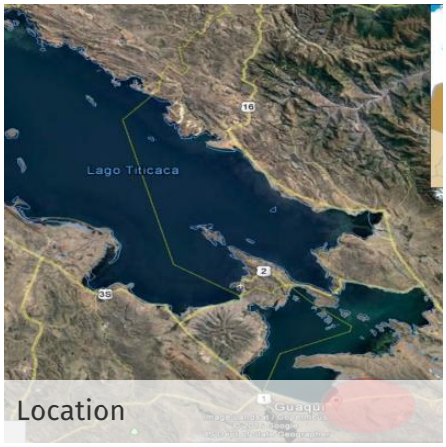
Project Information (pdf, 5.24 Mo)

Images

Project_Location

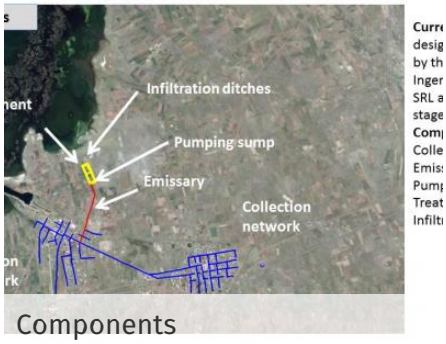


General_project_data



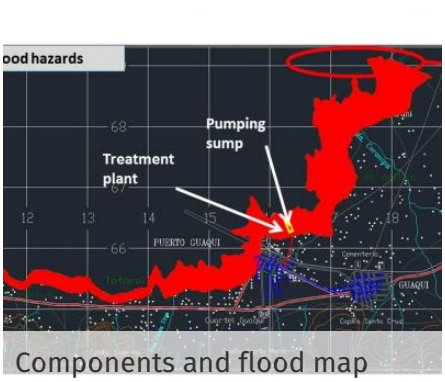
Location

Coverage and extension



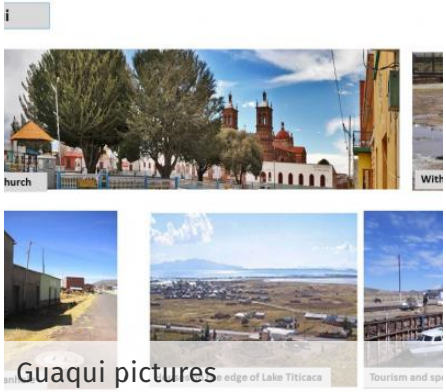
Components

Flood map



Components and flood map

Hazard map - Frosts



Guaqui pictures

Infrastructure

Infrastructure

Infrastructure

Infrastructure

Perspective des risques

Aléas naturels (hydro-météorologiques et géologiques)

Nom de l'aléa **Inondations**

Conséquence **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.**

> Risque sélectionné	Gravité	Probabilité	Importance
	Très nuisible	Probable	Risque élevé

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

Mesure potentielle

Capacity building in DRR for local communities

Valeur (optionnel) 3.40

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

> Mesure sélectionnée

Mesure potentielle

Strengthen operation and maintainance

Valeur (optionnel) 3.20

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

> Mesure sélectionnée

Mesure potentielle

Early warning system

Valeur (optionnel) 2.00

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

> Mesure sélectionnée

Mesure potentielle

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

Valeur (optionnel) 2.20

Commentaires Dykes to protect the plant's components

> Mesure sélectionnée

Mesure potentielle

Reduction of river discharge (river deviation)

Valeur (optionnel) 1.60

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

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Conséquence

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

> Risque sélectionné

Gravité	Probabilité	Importance
Très nuisible	Probable	Risque élevé

Vulnérabilités

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

Mesure potentielle

Use of water-resistant, robust equipment

Valeur (optionnel) 1.80

Commentaires Consider extreme events

> Mesure sélectionnée

Mesure potentielle

Risk transfer measures (insurance solutions)

Valeur (optionnel) 2.20

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

> Mesure sélectionnée

Conséquence

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.

Gravité	Probabilité	Importance
Peu nuisible	Probable	Risque faible

Vulnérabilités

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

Nom de l'aléa **Froids extrêmes**

Conséquence **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)**

> Risque sélectionné

Gravité	Probabilité	Importance
Nuisible	Probable	Risque moyen

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

Mesure potentielle **Change to appropriate materials**
Valeur (optionnel) 2.40
Commentaires Identify materials that support extreme cold temperatures
> Mesure sélectionnée

Mesure potentielle **Heating system**
Valeur (optionnel) 1.40
Commentaires Identify a technical solution that allows the plant's operation within the material's optimal temperature range (e.g. heating system)

Adapter le projet

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

Perspective des impacts

Impacts sur l'environnement

Élément du projet	Water treatment plant (oxidation basins) and pumping chamber
Impact négatif potentiel	Bad odors could disturb the surrounding population
Importance	Worsening of the quality of life for the local population and related health issues **> Impact sélectionné**
Mesure potentielle	**Artificial cover of the oxidation basins** Valeur (optionnel) 2.00 Commentaires Prevents odor emissions **> Mesure sélectionnée**

Élément du projet	Location of the water treatment plant
Impact négatif potentiel	Landscape changes due to the different construction sites
Importance	The water treatment plant could have an negative impact on the number of tourists visiting the Lake Titicaca region **> Impact sélectionné**
Mesure potentielle	**Land use plan** Valeur (optionnel) 3.60 Commentaires The water treatment plant can be included in the plan as an element which improves the quality of stay for tourists **> Mesure sélectionnée**
Mesure potentielle	**Change of technology** Valeur (optionnel) 1.20 Commentaires It would mean substantial changes in the design of the project
Impact négatif potentiel	The system will require large areas for construction

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

Impacts sur les risques de catastrophe

Élément du projet **Water treatment plant (oxidation basins)**

Impact négatif potentiel New settlements around the plant in the future

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

> Impact sélectionné

Mesure potentielle

Security strips

Valeur (optionnel) 3.20

Commentaires To be included in the territorial plans

> Mesure sélectionnée

Mesure potentielle

Purchase of land in surroundings

Valeur (optionnel) 1.20

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

Impact négatif potentiel Exposure of the Guaqui´s local population to greater risks from natural hazards and increase of vulnerability

Importance 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.

Impacts sur le climat

Élément du projet **Water treatment plant (oxidation basins)**

Impact négatif potentiel Greenhouse gas emissions from the oxidation basins

Importance 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

> Impact sélectionné

Mesure potentielle

Artificial cover of the oxidation basins

Valeur (optionnel) 2.20

Commentaires Storage of gases and burning with appropriate technology

> Mesure sélectionnée

Mesure potentielle

Carbon sinks (afforestation)

Valeur (optionnel) 1.20

Commentaires Reforestation to compensate for GHG emissions

Impact négatif potentiel

Emission of additional other gases by the water treatment system

Importance

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

Élément du projet Power systems of the plant

Impact négatif potentiel

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

Importance

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

> Impact sélectionné

Mesure potentielle

Use of alternative energies, energy generation through burning trapped gases from the oxidation basins

Valeur (optionnel) 1.60

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

> Mesure sélectionnée

Mesure potentielle

Connection to the national power supply system

Valeur (optionnel) 1.20

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

Adapter le projet

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

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