Internal Ex-Post Evaluation for Technical Cooperation Project

conducted by Cuba Office: December 2020

Country Name	The Project for Capacity Enhancement of Groundwater and Seawater Intrusion Management
Republic of Cuba	

I. Project Outline

Background	In the Provinces of Mayabeque and Artemisa in the coastal area, there exists a groundwater source area called Cuenca Sur, with an area of 300 km², which is one of the essential sources of water supply in the region. The progression of seawater intrusion was reported in the area of Cuenca Sur as a result of reduced annual rainfall and rising sea levels caused by climate change. It was confirmed that salinity of some wells in the Province of Artemisa exceeded the level which would affect agricultural crops. The use of groundwater nationwide accounted for 33.3% of total water use in 2011. Without proper management of groundwater, it was forecasted that there would be water supply shortage caused by the progression of seawater intrusion in groundwater aquifers in coastal areas throughout Cuba. Nevertheless, there were not sufficient technologies and human resources to carry out an assessment study on the influence of seawater intrusion to aquifers, salinization simulation and future forecast using a groundwater model, and to study effective measures.
Objectives of the Project	Through monitoring of aquifers, elaboration of the groundwater models, study on groundwater recharge and seawater intrusion control, and experimental implementation of the groundwater management plan in the Provinces of Mayabeque and Artemisa, the project aimed at improving the capacity of the institutions for groundwater development and management, thereby contributing to dissemination and utilization of the preparation method of Groundwater Management Plan. 1. Overall Goal: The preparation method of Groundwater Management Plan, developed in the Project, is disseminated and utilized in other areas. 2. Project Purpose: Capacity is improved in the institutions participating in the Project*[1] for groundwater development*[2] and management in the objective area, including limitations imposed on saline intrusion. *[1]) The Research, Project and Engineering Corporation Group (Grupo Empresarial de Investigaciones, Proyectos e Ingeniería: GEIPI) and the Water Resource Management Corporation Group (Grupo Empresarial de Aprovechamiento de Recrusos Hidráulicos: GEARH) whose original mandate was to provide training to local agencies under their respective umbrellas and other water-related institutions were planned to participate in some of the project activities besides the target group (implementing and leading agencies). “Institutions participating in the Project” mean all of these institutions. *[2]) Appropriate monitoring and management of groundwater levels would enable new groundwater development to be carried out.
Activities of the project	1. Project site: Cuenca Sur watershed area in the Provinces of Mayabeque and Artemisa. 2. Main activities: Monitoring of aquifers, elaboration of the groundwater models, study on groundwater recharge and seawater intrusion control, development of the groundwater management plan and the operation guideline/manual, etc. 3. Inputs (to carry out above activities) Japanese Side 1) Experts from Japan: 11 persons 2) Training in Japan: 10 persons 3) Equipment: Submersible pump, generator, geophysical prospection equipment, electrical resistivity equipment, vehicle, etc. 4) Local cost: hiring local consultants, maintenance of equipment, etc. Cuban Side 1) Staff allocated: 57 persons 2) Land and facilities: Office space in Habana and Quivicán, etc. 3) Local cost: Activities operation, etc.
Project Period	February 2013 to January 2017 / Project Cost: (ex-ante) 442 million yen, (actual) 445 million yen
Implementing Agency	National Institute of Hydraulic Resources (Instituto Nacional de Recursos Hidáulicos: INRH)
Cooperation Agency in Japan	Kokusai Kogyo Co., Ltd.

II. Result of the Evaluation

<Special Perspectives Considered in the Ex-Post Evaluation>

- Because of the outbreak of COVID-19, information was collected through a questionnaire survey and phone interviews to make evaluation judgement in the ex-post evaluation. Site visits were not conducted.

1 Relevance

<Consistency with the Development Policy of Cuba at the time of Ex-ante Evaluation>

The water sector was highly prioritized as well as the sectors of food, transportation, housing and so on in the national development plan at the time of ex-ante evaluation. Also, the water resource sector was prioritized by the Ministry of Economy and Planning which supervised the planned economy of Cuba. Thus, the project was consistent with the development policy of Cuba.

<Consistency with the Development Needs of Cuba at the time of Ex-ante Evaluation>

In Cuba, drought and salinization were serious problems due to climate change, and it was predicted that the amount of groundwater available for water supply and agricultural use would decrease throughout the country. The provinces of Mayabeque and Artemisa were

important agricultural production areas, and water resources needed to be managed in terms of promoting agricultural activities. In this sense, the project was consistent with the development needs of Cuba at the time of ex-ante evaluation.

<Consistency with Japan's ODA Policy at the time of Ex-ante Evaluation>

In October 2000, environmental conservation, agriculture and fisheries were recognized as development areas between the project identification mission team and the Cuban side. As groundwater development and management was included in the environmental conservation area, the project was consistent with Japan's ODA policy at the time of ex-ante evaluation[1].

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Status of Achievement for the Project Purpose at the time of Project Completion>

The Project Purpose was achieved by the time of project completion. The draft Groundwater Management Plan was submitted to INRH by GEIPI and GEARH. INRH and GEARH started the control of extracted water volume in the Provinces of Mayabeque and Artemisa, as recommended in the plan (Indicator 1). Through the project activities, related organizations including INRH strengthened various technical skills related to groundwater management, including monitoring, research method on water quality, assessment of the level of aquifers/seawater intrusion, and graphic processing.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

Since the project completion, the project effects have continued. GEARH and GEIPI formerly belonged to separate public corporation groups directly under INRH, but they were moved under the umbrella of the Integrated Management of Terrestrial Waters (Gestión Integrada de las Aguas Terrestres: GIAT) of the Superior Organization of the Corporation Directorate (Organización Superior de Dirección Empresarial: OSDE), which was administrated by INRH, as a result of the organizational restructuring in 2019. There has been no change in duties of INRH and GEARH and their collaborative relationship with provincial organizations, and they have continued the control of extracted water volume, as recommended in the Groundwater Management Plan. The groundwater model developed by the project has not been updated due to human resource shortages, but the developed Groundwater Management Plan has been updated at the same time each year since it was approved in December 2017.

<Status of Achievement for Overall Goal at the time of Ex-post Evaluation>

The Overall Goal has been achieved by the time of ex-post evaluation. The strengthening of hydrological program and the management of indicators related to water productivity for developing the groundwater management plan have been implemented in the Ariguanabo watershed in the Province of Artemisa, which has been positioned as one of the most important watershed areas for the national interest in the document of INRH. Since the project completion, training and experience sharing have been carried out so that the groundwater management plan could be developed in other areas based on the project experience. For example, the Water Resources Management Corporation (Empresas de Aprovechamiento Hidráulico: EAH) of Artemisa Province conducted training on groundwater use methods for a total of 75 farmers and municipality officials in 2018 and 2019. As well, EAH of Mayabeque Province conducted training on the water balance management for a total of 52 employees of INRH, provincial officers of the Ministry of Agriculture, and employees of Sugar Enterprise Group in 2018 and 2020. GEIPI conducted five training workshops in 2017 and 2018 for a total of 118 employees of the Research, Planning and Engineering Corporation Groups (Empresa de Investigaciones, Proyectos e Ingeniería: EIPI) of all provinces and EAH of Artemisa and Mayabeque. Training topics included GIS, hydrology, thematic hydrographic mapping, and aquifer analysis. Some of these trainings were supported by the Training Institute of Villa Clara under INRH.

<Other Impacts at the time of Ex-post Evaluation>

Firstly, since the project completion, the Groundwater Management Plan prepared by the project has been put into full operation in the Provinces of Artemisa and Mayabeque. This has led to the securing of agricultural water. According to INRH, water use for agriculture has increased by 2% in both provinces, andin Mayabeque Province, the Agriculture and Livestock Corporation expanded the irrigated area. The experience of operating the Groundwater Management Plan in both provinces was reflected in the "National Water Policy" in 2018. Secondly, the importance of functions of the Dique Sur (51km long dyke built in 1991 on the coast from Artemisa Province to Mayabeque Province) was reaffirmed by the project, and its renovation was carried out in 2017. This has resulted in a rise in water levels in the wells near the dyke and improved the balance between fresh and salt water.

Eight of the 10 automatic water-gauges provided by the project were stolen or destroyed. This was due to the fact that the purpose of the equipment and the importance of monitoring of the groundwater level were not properly understood by community residents. To solve this, INRH explained the importance of groundwater monitoring and equipment maintenance to the community residents, and the monitoring wells have been locked up.

No negative impact on the natural environment has occurred.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is high.

Achievement of the Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) Capacity is improved in the institutions participating in the Project for groundwater development and management in the objective area, including limitations imposed on saline intrusion.	1. The control of water volume extracted is implemented on the basis of Groundwater Management Plan.	Status of achievement: Achieved (Continued) (Project Completion) - INRH and GEARH started the control of extracted water volume in the Provinces of Mayabeque and Artemisa, as recommended in the Groundwater Management Plan. (Ex-post Evaluation) - INRH and GEARH has continued the control of extracted water volume, as recommended in the Groundwater Management Plan.
(Overall goal)	1. The preparation of	Status of achievement: Achieved. (Ex-post Evaluation)

[1] Ministry of Foreign Affairs, "ODA Databook 2013."

The preparation method of Groundwater Management Plan, developed in the Project, is disseminated and utilized in other areas	Groundwater Management Plan is started in more than one area that is different from the target areas of the Project.	- The hydrological program for the development of the groundwater management plan has been implemented and indicators related to water productivity have been managed in the Ariguanabo watershed in the Province of Artemisa.

Source: Project Completion Report and information provided by INRH and OSDE-GIAT.

3 Efficiency

The project period was as planned, but the project cost slightly exceeded the plan (ratio against the plan: 100% and 101%, respectively). Outputs were produced as planned. Therefore, the project efficiency is fair.

4 Sustainability

<Policy Aspect>

In the "National Water Policy", necessity of rational use of water in underground aquifers and water quality risk management and weather risk management has been described. Also, another policies, "Efficient and Rational Use of Water" (2018-2030) and "Actions for Mitigation of the Impacts of Extreme Weather" (2018-2030), have included programs for developing and strengthening groundwater management.

<Institutional/Organizational Aspect>

As mentioned above, GEARH and GEIPI were moved under the umbrella of OSDE-GIAT of INRH as a result of the organizational restructuring in 2019. INRH has become the administrative body responsible for managing the performance of the two corporation groups, and the organizational structure has been designed to promote and disseminate improved groundwater development and management capacity. In all of EAH of Artemisa and Mayabeque and EIPI of Habana, there has been a personnel shortage in departments related to hydrological services, water balance, and so on, because there have been few qualified personnel. In addition, only one of the three employees of EIPI of Habana who had worked at the project has remained working, who, however, would soon retire. As a solution to these issues, it has been planned that new personnel would be recruited from the university graduates for the year 2020, in coordination with the Ministry of Labor and the Ministry of Higher Education.

Results of the groundwater monitoring has been shared with EAH of Mayabeque and Artemisa in the form of a GIS database, which has been reflected in the database via the site (GIS Hidrocuba) on the INRH cloud server. EAH of other provinces have been able to access the database of INRH via the website or off-line where it is not available. INRH and OSDE have signed joint research agreements not only with the University of José Antonio Echeverría, with which the project established the collaboration mechanism, but also with other universities and research institutions. INRH has also worked with the Ministry of Agriculture, the Ministry of Revolutionary Armed Forces, the Sugar Enterprise Group and the Ministry of Science, Technology and Environment on policies related to the efficient use of water and combating climate change. Besides these agencies, INRH has collaborated with the Ministry of Communications, the Ministry of Industry, the Cuban Institute of Radio and Television, the Ministry of Education and the Ministry of Higher Education on groundwater management and development.

<Technical Aspect>

INRH has sustained the system for the information management and utilization needed to promote improved groundwater development and management capacity, as it has developed the national hydrogeological map and a program to integrate various types of information and decision-making (Hidrocuba). OSDE-GIAT has had training records for capacity development of data monitoring and management related to hydrological services, water balance, hydrogeology of underground aquifers, etc, and it has used the records when conducting site visits. The guidelines and manuals for developing the Groundwater Management Plan prepared by the Project have been utilized. Some of the equipment provided by the project have remained unrepaired because of the inability to repairers in the country and the unavailability of spare parts in the country due to the economic sanctions imposed by the United States, while other equipment have been in good condition and have been utilized. The list of contacts and suppliers of equipment prepared by the project has been utilized, and most have been repaired and procured in the country.

<Financial Aspect>

The budget information of OSDE-GIAT specific for improving capacity of underground water development and management was not available, but the total budget has been expected to increase as shown in the table. However, the budget for capacity building would be financed in the domestic currency, but there has been a restriction that sufficient convertible Cuban pesos (CUC) [2] for procuring equipment and spare parts from other countries have not been secured.

Table: Budget Plan of OSDE-GIAT (CUC)

	2020	2021	2022	2023	2024
Revenue	599,529.7	602,527.3	605,540.0	608,567.7	611,610.5
Expenditure	488,173.0	489,149.3	490,127.6	491,107.9	492,090.1

Source: Questionnaire survey with SDE-GIAT.

Regarding INRH, the budget of 2019 was more than 709 million pesos (for which it could not be confirmed if it was CUC or Cuban pesos (CUP)). INRH answered that the budget has been sufficient, although the financial data specific for improving capacity of underground water development and management was not available.

<Evaluation Result>

In the light above, there have been slight issues in the technical and financial aspects. Therefore, the sustainability of the effects is fair.

5 Summary of the Evaluation

The Project Purpose was achieved, and the project effects have continued. Related organizations have improved the capacity for underground water development and management, including the preparation and implementation of the Underground Management Plan. The Underground Management Plan has been continuously operated in the target provinces. With regard to the Overall Goal, the Underground Management Plan has been started in other areas. Regarding sustainability, although some equipment has been unrepaired,

[2] Cuba has a dual currency system. The two currencies coexist; One is Cuban peso (CUP) which are generally circulated in the country, and the other is convertible Cuban peso (CUC) which can be exchanged with foreign currencies. The exchange rate in the market is fixed at 1USD=1CUC=24CUP. However, exchange rates different from that in the market are used at government organizations, such as 1USD=1CUC=1CUP or 1CUP=10CUP, and therefore it is not stable and sufficient to secure the budget in CUC. The 6th Congress of the Communist Party in 2011 has decided on a policy to resolve the dual currency system, but the specific timing has been still unclear.

the organizational structure including the network among the related organizations have been sustained. As for efficiency, the project cost slightly exceeded the plan.

Considering all of the above points, this project is evaluated to be satisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing agency:

- For further effective and sustainable dissemination of the project results

The groundwater management capacity was strengthened by the project, and certain effects have continued since the project completion. In order to further demonstrate management capacity and bring impacts in the future, it is recommended to INRH to focus on effective implementation of the developed groundwater management plan, and to strengthen communication and coordination with water users, especially with stakeholders of other ministries such as the Ministry of Agriculture and Livestock (corporations under related ministries, municipalities, and so on), which is a major consumer. Strengthening collaboration with relevant agencies would further ensure the sustainability of the project effects.

- Mid-term and long-term of human resource development

Given the ongoing reorganization of ministries, state-owned enterprises and other organizations, human resource development in the field of groundwater management should be addressed across generations and organizations. It is recommended to INRH to further promote cooperation and personnel exchange with the universities and research institutes that have already begun to make joint efforts, especially to develop the capacity of young people.

Lessons Learned:

- Procurement of the equipment in light of the economic sanctions and foreign currency shortages

As Cuba has been in the severe economic environment under the economic sanctions imposed by the United States, it has been difficult to import goods from the United States and even third countries and the situations have been changing. Therefore, careful consideration was needed in the selection of equipment to be provided. In case that it is expected at the project planning stage that importing additional spare parts is difficult, it would be effective to accurately identify the spare parts needed for maintenance and management at the initial stage of equipment selection, and to provide necessary parts along with the provision of equipment. And, by the time of project completion, it is important to clarify the procurement process (list of the suppliers, procedures, section in charge of securing budgets, timing, etc.) so that spare parts could be procured at the appropriate timing.

JICA Borewell #1 in operation (Artemisa)

GPS equipment (EAH of Artemisa)