Internal Ex-Post Evaluation for Technical Cooperation Project (SATREPS[1])

Conducted by Burkina Faso Office: April, 2021

Country Name	**Improving Sustainable Water and Sanitation Systems in Sahel Region in Africa: Case of Burkina Faso**
Burkina Faso	

I. Project Outline

Background	Burkina Faso is located in Sahel Region in Africa with severe climate conditions causing less rain falls with larger volatility by area and by year and longer draughts. In the country, the population with access to safe water limited to only 58%. For the rural population, less than 1% of them utilized proper hygienic sanitation facility (toilets). Utilization of unsafe drinking water and lack of proper sanitation facilities caused water-borne diseases, such as diarrhea. In addition to the limited water resources, rural poverty and insufficient public services and management for water supply and sanitation were attributed to those problems. Under those situations, development of appropriate water supply and drainage system responding to the climate conditions and social conditions was an urgent issue for the country in order to attain the Millennium Development Goals (MDGs).		
Project Objectives	Through development of element technologies for the rural sanitation model, development of the urban sanitation model, delivery of trainings on the proposed sanitation models and preparation of the business model for introduction of the proposed models, the project aimed at development and experiment of the systems of drinking water supply and sanitation (l'Approvisionnement en Eau Potable et de l'Assainissment: AEPA) based on the concept of No mixing" and "No collecting" as well as promotion of preparation for implementation of the systems. 1. Expected Overall Goal: N/A 2. Project Purpose: The systems for supply of drinking water and sanitation, which are adopted to the Sahel Region, are developed and experimented based on the concept of "No mixing" and "No collecting", and preparation for implementation of the systems is promoted.		
Project Activities	1. Project Site: Urban area (the capitol city of Ouagadougou) and the pilot villages in the vicinity of Ouagadougou (Kolonguessé , Barkoundouba, and Kamboinse) 2. Main Activities: i) developing element technologies for the rural sanitation model (composting toilet), ii) developing the urban sanitation model (grey water treatment), iii) trainings on the proposed sanitation models, including making, repair and improvement of the system, for local technicians, iv) proposing business model for introduction of the proposed sanitation models 3. Inputs (to carry out above activities) Japanese Side 1) Experts: 26 persons 2) Trainees received: 12 persons 3) Equipment: sample analysis equipment, demonstration plant and equipment, 4) Operational Cost Burkina Faso Side 1) Staff allocated: 9 persons 2) Land and Facilities: Office space in the Ministry of Water, Hydraulic Facilities and Sanitation 3) Operational Cost: a part of personnel cost		
Project Period	March 2010 – February 2015	Project Cost	Actual: 450million yen Ex-ante: 475 million yen
Implementing Agencies	Ministry of Agriculture, Water Resources, Sanitation and Food Security (MARHASA) (In October 2014, the Ministry of Water, Hydraulic Facilities and Sanitation (MEAHA) was merged with the Ministry of Agriculture), The International Institute for Water and Environmental Engineering (2iE)		
Cooperation Agency in Japan	Hokkaido University, the University of Tokyo, National Institute for Land and Infrastructure Management, Tama University, Fuji Women's University, Kochi University of Technology, Sapporo City University, Center for Environmental Science in Saitama		

II. Result of the Evaluation

< Special Perspectives Considered in the Ex-Post Evaluation >

[Expected Overall Goal and Utilization of Research Outcomes]

Since there is no Overall Goal set by the project design or the Master Plan agreed by the both sides of Japan and Burkina Faso, it is not possible to verify achievement level of the expected Overall Goal. Thus, only the envisaged efforts for utilization of research outcomes (introduction of the rural and urban models of AEPA systems developed by the project) was verified as expected positive impacts.

1 Relevance

<Consistency with the Development Policy of Burkina Faso at the Time of Ex-Ante Evaluation >

The Project was consistent with Burkina Faso's policies to prioritize improvement of safe water supply set in "Poverty Reduction Strategy Paper" (2004) and the "National Programme of Supply of Drinking Water and Sanitation (Programme National de l'Approvisionnement en Eau Potable et de l'Assainissment: PN-AEPA), and to focus on sustainable use of agricultural resources set in the "Sustainable Agricultural Development Strategy towards 2030".

<Consistency with the Development Needs of Burkina Faso at the Time of Ex-Ante Evaluation >

The Project was consistent with Burkina Faso's development needs for improvement of access to safe water and sanitation as well as sustainable agricultural production with efficient water management.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

The Project was consistent with Japan's ODA Policy for Burkina Faso, prioritizing support for the area of basic human needs including water and sanitation[2].

<Evaluation Result>

[1] SATREPS: Science and Technology Research Partnership for Sustainable Development

[2] Ministry of Foreign Affairs, "ODA Country Databook 2009"

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

2 Effectiveness/Impact

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

The Project Purpose was achieved at the time of project completion. The comparative table of performance of the system developed with the conventional water supply and sanitation system and the manual for the application were drafted (Indicator 1). The rural model for sanitation and agricultural technology and the urban model for reuse of greywater were proposed and the manuals and the reports were submitted to the government of Burkina Faso (Indicator 2). 4 articles by the researchers of 2iE as a principal author were published in the scientific journals with the impact factor (Indicator 3). In the three pilot sites, 1 toilet and 2 greywater treatment units were utilized in Kolongondjesse and 1 toilet and 1 greywater treatment were utilized in Barkoundouba but no toilet and greywater treatment unit were utilized in Kamobinsin (Indicator 4).

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

The project effects have partially continued since project completion. Among the research outputs, the low cost household greywater treatment unit for rural areas and ceramic filtration were utilized. However, despite the importance of the proposed model, no local company has appropriated the proposed model due to the fear of the risk of investment and especially the problem of social acceptance of the reuse of human excrement..The composting toilets and greywater treatment units installed in the pilot villages have been continuously utilized by the beneficiary families until 2018, but they have been no longer functional. Also, the high efficiency algal channel wastewater treatment plant has been utilized by 2iE for treatment of waste in campus of Kamboinsé until 2019 but no longer functional. The composting toilets developed by the SATREPS project cannot be popularized among the people especially at the current stage because of their high cost and the difficulty of finding spare parts.

The composting toilets have been rehabilitated through 2 extensions research projects implemented by 2iE with funding from the National Fund for Research and Innovation in Burkina Faso: The experimental project on an autonomous family sanitation system by vermifiltration and the development project of an ecological toilet linked to a compost pit to value human excreta. The modification of household-level graywater treatment systems for performance improvement was conducted by the project by Joseph KY ZERBO University of Ouagadougou with funding from the US National Academy of Sciences. The extension of the use of ceramic filters for home water treatment has been implemented by the Barka Association through the Social Responsibility and Environmental Program (CSR) in the YEPI project (Youth Economic Participation on Initiative) on finance of MasterCards Foundation via Tufts University in Boston, USA.

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

In terms of utilization of the research outcomes of the SATREPS project, there has been no program or project based on the research recommendation by the project, “Integrated water resource management for food security in Burkina Faso”. The introduction of the rural and urban models of the AEPA system proposed by the SATREPS project has been limited so far. The composting toilets and the greywater treatment system have not been utilized by the population due to the expensive cost for the population and the complexity of the system. On the other hand, 2iE has continued the experimentation project of an autonomous family sanitation system by vermifiltration, the project of development of an ecological toilet linked to a compost pit for the valorization of human excreta, the project of development of a greywater treatment system by vermifiltration, the project of development of ceramic filters from local clays of Burkina Faso. In addition, Joseph KY ZERBO University has conducted the project on the modification of graywater treatment systems at the household as mentioned above.

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

There are some positive impacts of the Project confirmed at the time of the ex-post evaluation. The use of treated graywater by the unit installed by the project brought about income from family market gardening and improvement of women's living conditions. Also, the use of ceramic filters has reduction of water-borne diseases of children through the provision of drinking water of good quality at the point of consumption. In addition, the toilet installed by the project has reduced the risk of fecal danger.

The SATREPS project contributed to improvement of analytical skills of the researchers through collaborative research conducted as part of the project. All the researchers engaged in the SATREPS project have benefited residence mobility in laboratories in Japan. These mobility trips have enabled the training of all researchers involved in learning analytical techniques on different matrices of water, sludge and crops. In the same way, the acquisition of laboratory equipment has made it possible to strengthen the technical analysis platform of the 2iE Laboratory. Many students in master and doctor courses have benefited from the SATREPS project through internships and completion of Ph.D dissertation

In addition, the SATREPS project has strengthened scientific production. Thanks to the diversity of research themes tackled in the SATREPS project, the researchers involved in the SATREPS project made many scientific publications in terms of scientific articles. This allowed them to progress in academic degrees. Furthermore, 2iE has benefited greatly from the SATREPS project by strengthening the teaching and research capacities of the teacher-researchers involved in this project. Course contents also improved and enriched by concrete case studies of the SATREPS project. Joseph KY ZERBO University benefited from the SATREPS project through the recruitment of trainee students and doctor students participating in the project. Students who participated in the project will bring their experiences to Joseph KY ZERBO University students. No negative impact has been observed.

<Evaluation Result>

Therefore, both the effectiveness and impact of the project is fair.

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) The systems for supply of drinking water and sanitation, which are adopted to the Sahel Region, are developed and	Indicator 1: Comparative table of performance of the system developed by the report with the conventional AEPA (water supply and sanitation) system, and manual for their application (detail information of	Achievement Status: Achieved (Partially continued) (Project Completion) ● The comparative table and the manual were drafted. (Ex-Post Evaluation) Among the research outputs, the following system have not been functioning anymore but the technologies for the system have been modified and

experimented based on the concept of “No mixing” and “No collecting”, and preparation for implementation of the systems is promoted.	characteristics, environmental conditions, maintenance methods, cost required, and so on)	rehabilitated by other institutions for utilization. : ● Low cost household greywater treatment unit for rural areas ● Ceramic filtration
	Indicator 2: Proposal document addressing the government of Burkina Faso for introduction of the system developed.	Achievement Status: Achieved (Not continued) (Project Completion) ● The rural model (use of excreta, urine and greywater and agricultural technique) and the urban model (collection and reuse of greywater) were proposed. ● The manual and the final report were prepared and submitted to the government of Burkina Faso. (Ex-Post Evaluation) ● The models proposed have not been introduced yet.
	Indicator 3: Status of publication of articles by the researchers of 2iE in the scientific journals with the impact factor.	Achievement Status: Achieved (Continued) (Project Completion) ● 4 articles by the researchers of 2iE as a principal author were published in the scientific journals with the impact factor. (Ex-Post Evaluation) ● The researchers involved in the SATREPS project made many scientific publications in terms of scientific articles.
	Indicator 4: Status of operation of the pilot systems at the village level.	Achievement Status: Partially achieved (Continued) (Project Completion) ● Kolongondjesse: 1 out of 3 installed toilets was utilized, 2 out of 4 greywater treatment units were utilized ● Barkoundouba: 1 out of 3 toilets was utilized, 1 out of 2 greywater treatment units was utilized. ● Kamobinsin: 0 out of 2 toilets was utilized, 0 out of 2 greywater treatment units was utilized. (Ex-Post Evaluation) • In the pilot villages, the compost toilets and the greywater treatment units have been modified and the rehabilitated systems have been utilized.

Source：Terminal Evaluation Report, JST Terminal Report, Questionnaires and interviews with 2iE

3 Efficiency

Although the project period was as planned (the ratio against the planned: 100%), the project cost slightly exceeded the plan (the ratios against the plan: 105%). The project outputs were produced as planned.

Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspects>

For the management of water and sanitation sector, the government has developed 5 programs: the Governance Program for the Water and Sanitation Sector in Burkina Faso by 2030 (Programme Gouvernance du sous-secteur Eau et Assainissement à l’horizon 2030, PGEA 2016-2030), PN-AEP （2016 - 2030), the National Program for Integrated Management of Water Resources by 2030 (Programme National pour la Gestion Intégrée des Ressources en Eau: PNGIRE 2016 - 2030), the National Program for Hydraulic Improvements (Programme National Aménagements Hydrauliques: PNAH) for 2030. All of these programs are part of the implementation of the Sustainable Development Goals.

Regarding water and sanitation, the challenges are: (i) mobilization, management, preservation and sustainable development of water resources, (ii) improving access to water services and sanitation, (iii) protecting existing ecosystems and preserving the living environment, (iv) strengthening international cooperation in the area of water and (v) improving knowledge of water resources.

<Institutional/Organizational Aspects>

The research outputs by the SATREPS project were shared with the Ministry of Water and Sanitation, which has appropriately used in sanitation policies, recovery of wastewater and improving access to water. However, there is not a tacit organization / institutional arrangement for utilization of the research outcomes of the SATREPS project.

The operation and maintenance of the research facilities/equipment is solely the responsibility of the beneficiary households with regard to composting toilets, gray water treatment units and ceramic filters. The operation and maintenance of the high-yield algal channel wastewater treatment plant has been devolved to 2iE. As mentioned above, the pilot toilets and the high-yield agal channel wastewater treatment plant have been no longer functional for many reasons

<Technical Aspects>

Through editing of new projects based on the research results of the SATREPS project, the researchers of 2iE have sustained their research capacity to continue the related research activities by using the laboratory equipment acquired in the SATREPS project and also by using the results of the research to improve the course content. This is the case, for example, of the ecological remediation course that has been enriched by research results on the composting toilets and the water treatment technologies.

2iE has continuously used “Design Manual for high rate settleable algae pond (HRSAP)” for trainings. Manuals for composting toilet, greywater treatment units, ceramic filtration unit, urine use have been utilized by the beneficiary households and guide for agricultural reuse of compost, urine and greywater have been used by vegetable producers.

On the other hand, since difficult maintenance of the composting toilets and the high-speed algal channel wastewater treatment plant has required external experts to repair them and constrained the continuous operations as mentioned above.

<Financial Aspects>

The National Fund for Research and Innovation in Burkina Faso has been allocated for the experimental project of an autonomous family vermifiltration wastewater treatment system and the development project of an ecological toilet linked to a compost pit for the valuation of human excreta. Also, the Fund has been allocated to the project on the modification of household-level graywater treatment systems for performance improvement by Joseph KY ZERBO University of Ouagadougou with funding from the US National Academy of Sciences. MasterCard's Foundation via Tufts University has financed for the extension of the use of ceramic filters for home water treatment by the Barka Association through the Corporate Social and Environmental Responsibility (CSR) program within the framework of the YEPI project. On the other hand, the scientific research in the field of water and sanitation has faced with insufficient funding. This is a reason why the government of Burkina Faso puts more emphasis on the construction of infrastructure based on the idea that more hydraulic facilities are needed in order to increase the rate of access to drinking water, and eventually achieve the Sustainable Development Goals (SDGs).

In addition, high costs of the maintenance of composting toilets and the high-speed algal channel wastewater treatment plant and difficulty to procure spare parts for the facilities and equipment have constrained the proper maintenance and the continuous operations of the facilities and equipment.

<Evaluation Result>

In the light above, there have been some problems from the institutional aspect. Therefore, the sustainability of the effects through the Project is fair.

5 Summary of the Evaluation

The project partially achieved the Project Purpose through the development of the composting toilets and the greywater treatment technologies and ceramic filtration for safe water. As for sustainability, the lack of local technical capacity and the high maintenance cost of the units developed and installed by the SATREPS project have constrained the proper maintenance and continuous operation as well as dissemination of the key research outputs of composting toilets and the high-speed algal channel wastewater treatment plant. As for efficiency, the project cost slightly exceeded the plan. Considering all of the above points, this project is evaluated to be partially satisfactory.

III. Recommendations & Lessons Learnt

Recommendations for Implementing Agency:

- Continue research on the devices and facilities developed by the SATREPS project in order to make it operational among population in Burkina Faso.
- Promote the devices and facilities developed by the SATREPS project under the initiative of the Ministry in charge of water and sanitation.

Lessons Learnt for JICA:

- In the context of SATREPS projects, JICA also needs to focus on the aspect of dissemination of research results. The composting toilets developed by the SATREPS project cannot be popularized among the people especially at the current stage because of their high cost and the difficulty of finding spare parts. Although the main purpose of the SATREPS project is research and development of technologies to solve global issues including energy, environment and infectious diseases, it is essential to realize utilization of the research outcomes through consideration of affordability of the target beneficiaries who utilize the technologies developed and/or applied by the SATREPS project. If JICA finds effectiveness of the technologies developed and/or applied by the SATREPS project as a solution of the global issues above mentioned, it is desirable for JICA to consider applicability and affordability of technologies to be researched and developed under SATREPS projects, including availability of spare parts at local market, for the target groups in order to promote utilization of the research outcomes/outputs at the time of project design and the follow-up stage.

The pilot high-speed aglal channel wastewater treatment plant in the campus of Kamboinsé, 2iE

The pilot composting toilet in Barkoundouba village