

Development of a Model System for Participatory Community Waste Water Treatment Using Low-cost, Space-saving Technology in Densely Populated Area of Yogyakarta Special Province

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Abstract

A model system for participatory communal waste water treatment system was developed in densely populated area of Yogyakarta special province. After the community member's awareness for sanitation and motivation for the system was developed, affordable technology was carefully selected. As the community member's income was low and the available space for the system was very limited, rotating biological contactors with three dimensional lattice media was selected. The technology was also characterized with easiness of operation. After short training of operation and maintenance, the system has been continuously operated by community members with their own expense.

Keywords

communal waste water treatment; participatory development; rotating biological contactors

BACKGROUND

In Indonesia, centralized sewage treatment system covers only small part of urban area. Although individual waste water treatment facility such as septic tank is diffused, its performance is unsatisfactory, and also septic tank is difficult to be applied in densely populated area as it will bring about underground water pollution. Therefore, off-site waste water treatment in community level is required. For the sustainability of the system, participation of the community people and selection of appropriate technology that fits the socio-economical condition of the community are indispensable.

Under this context, APEX (Asian People's Exchange, a Japanese NGO) and YDD(Yayasan Dian Desa, an Indonesian NGO) has cooperatively implemented a project named "Development of a Model System for Participatory Community Waste Water Treatment in Densely Populated Area of Yogyakarta Special Province" as JICA (Japan International Cooperation Agency) Partnership Program. The project aimed to develop a model system of communal waste water treatment with participation of community people.

TARGET COMMUNITY

As the project aims to develop the model system which is widely applicable to other area, we chose a community of RW 8 RT34, Kricak Kidul, Kel.Kricak, Kec.Tegal Rejo, Yogyakarta as one of target area, where 260 people living in 5,500 m² (473 capita/m²). Located at Winogo riverside, Kricak is a typical densely populated community in urban area. Before the project was started, more than half of the family in the community did not have toilet and they used the river instead.

PARTICIPATORY ASSESMENT

In order to develop participatory system, after consensus as for the project among all stake holders such as local government, community leaders etc. was developed, the committee for implementation of the project was formed and participatory assessment regarding the community's condition related to sanitation was conducted by the community themselves. By their own classification, 62% families of the community was poor with income of less than one million rupiah per month, 26% was intermediate income with one to two million rupiah. Only 12% families were categorized as rich families with monthly income of more than two million rupiah. About half of the families did not have toilet in their houses, using Winogo river as open toilet. Figure 1 shows the sanitation map of the community drawn by themselves, showing location of houses by category of income, toilet, well etc. in the participatory assessment activity. *E.coli* was detected in water from every well in the community.

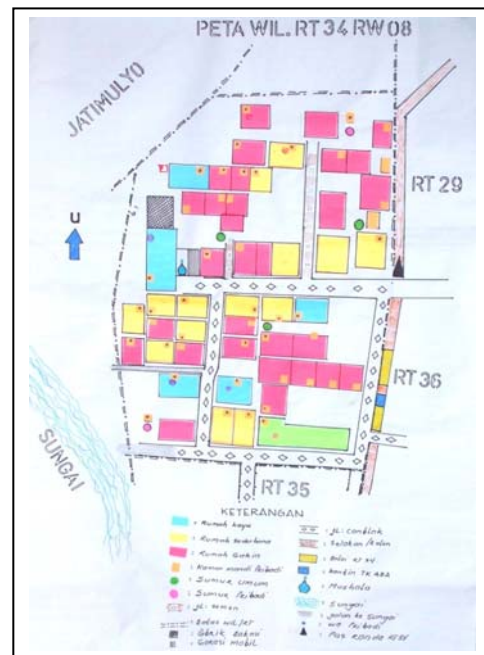


Figure 1. Sanitation map of the community drawn by the community members

TECHNOLOGICAL CHOICE

After the motivation of community members as for the communal waste water treatment was established, the technology which fits the community was selected. As available space for waste water treatment plant is very limited, that is about 12 m², and as people's income is low, low-cost, space saving technology was required. For this reason, Rotating Biological Contactors (RBC) with three dimensional lattice media

(Figure 2) was selected as the kind of RBC is able to accept very high volumetric organic loading (Figure 3). Also, as RBC is characterized by its easiness of operation, it is expected that the community people can afford to operate it by themselves. Remaining space other than the RBC was used for primary sedimentation tank, anaerobic filter and final sedimentation tank (Figure.4). This kind of combination system which has anaerobic process and aerobic process is a reasonable technological option. If we only use anaerobic process, energy consumption is small but the quality of the treated water is rather low. On the contrary, if we only use aerobic process, quality of the treated water can be high but energy consumption is large. Therefore if we combine anaerobic process with following aerobic process, low energy consumption

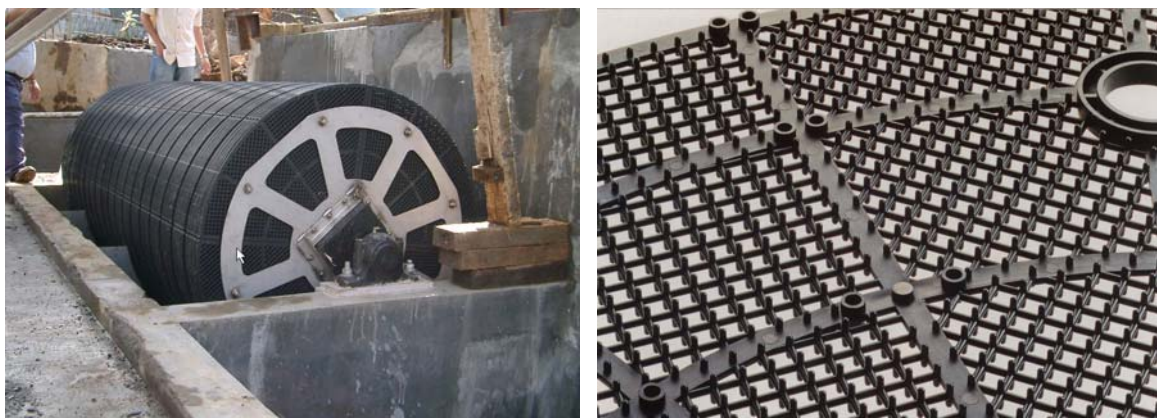


Figure 2. Rotating Biological Contactors with three dimensional lattice media

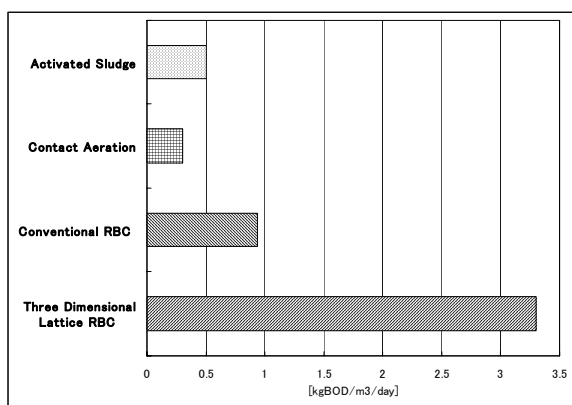


Figure 3. Volumetric organic loading for various aerobic process

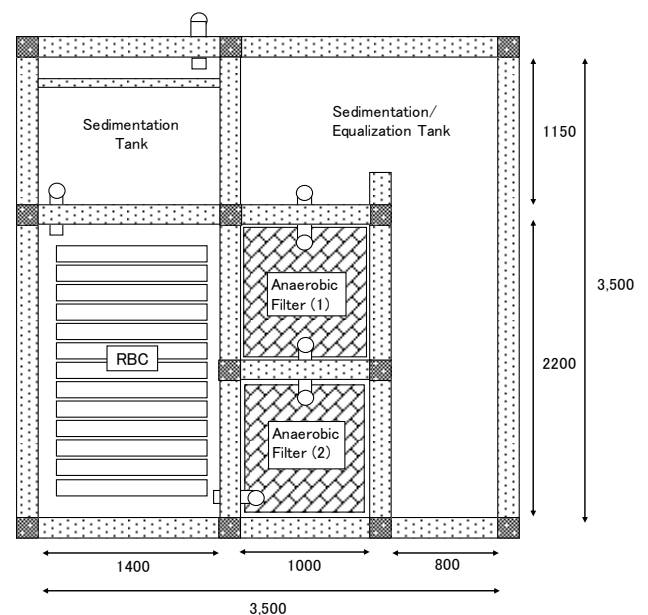


Figure 4. Layout of communal waste water treatment plant for Kricak community

and high treated water quality process can be realized. After the technological selection, the system was constructed with participation of community members.

OPERATION AND MAINTENANCE

After the communal waste water treatment system was installed, training for the community members regarding operation and maintenance of the system was conducted. Operation and maintenance team consisted of four community members was organized by the community themselves. Manual for operation and maintenance was edited and distributed as guidance. In order to realize good performance, several caution such as using biodegradable detergent, refrain from discarding solid matter to the sewage system was announced in the community.

Operation of the process is easy one, just rotate the RBC continuously. As for maintenance, periodical make up of grease and oil to several mechanic parts of RBC and also periodical de-sludging of sedimentation tank is necessary. But both of them are affordable for the community member's O&M team.

Up to now (February 2010), the system has been continuously operated and maintained by community members themselves for more than one and a half year, with their own expense of 300Rp-500Rp per family a day. By combination of anaerobic and aerobic process, the waste water has been treated to effluent COD level of below 50ppm with several exceptions. The construction cost of the system was 340,000Rp per family for waste water treatment plant and 80,000Rp per family for piping.

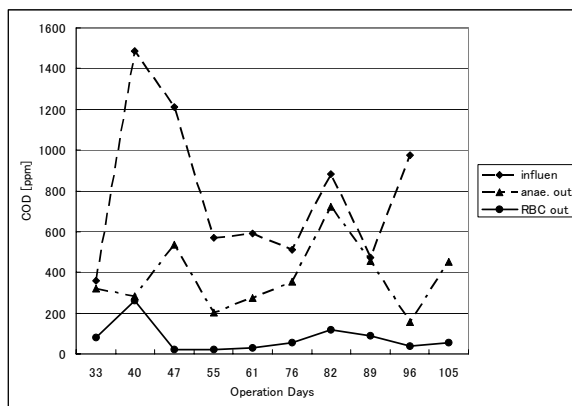


Figure 5. Performance of communal waste water treatment plant for Kricak

References

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