Village-level Impounding: An Urgent Need for Sub-Saharan Countries

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I esteem it a great honor to have received a nomination for the 2007 JRCSA Award and have been presented it at the 15th JRCSA annual congress held on 1 November, 2007 in Miyazaki, organized by Dr. Yasuhiro Akiyoshi and Dr. Hirofumi Inagaki, Professors of Miyazaki University. I extend my heartfelt thanks to the Award Screening Committee, chaired by Dr. Yoshitaka Yoshitake, Professor of Ehime University, for elevating me to the status of a JRCSA Award recipient, and also to the members of the JRCSA Executive Board and Council headed by Professor Dr. Tsugio Ezaki, President of JRCSA. Thanks are also due to all the compatriot members of JRCSA who are grappling with and making efforts to contribute toward solving the water resources and/or hydro-environmental issues of the day in the context of catching rainwater.

I realize that my receipt of this high honor is a result of generous merged evaluation on my past different two undeserving achievements; the leadership in an international cooperative research project and the involvement in administration of JRCSA.

The research project is associated with rainwater harvesting in semi-arid areas. Scrutiny for leadership in project implementation was undergone by the published outcome; one principal and five ancillary follow-up research papers, which were published in the issue of Vol.11 No.1 (2005) of this journal with the entitlement of “An Irrigation Tank for Harvesting Rainwater in Semi-arid Savannah Areas” and in the same and other scientific journals, respectively. Emphasizing this as main, the certificate is inscribed with the achievement title of “A Pilot Study on Runoff Forming Rainwater Harvesting in Semi-arid Savannah Areas.”

This project was undertaken as collaboration with Agricultural Research Center (ARC), Kpong, Faculty of Agriculture, University of Ghana, with financial support by the grant-in-aid for scientific research, funded by Japan Society for the Promotion of Science (JSPS). As a four-year rolling plan during fiscal 2001 to 2004, it was successfully implemented with devoted cooperation of numbers of professionals, farmers and workers. Especially the names of Dr. Shigeyasu Aoyama (Emeritus Professor of Kyoto University; currently, Professor of Ishikawa Prefectural University), Mr. Kunio Watabe (Licensed Professional Engineer of Tokyo Construction Co. Ltd.) and Dr. Koichi Unami (Associate Professor of Kyoto University), who gave me their full support and cooperation, must here be mentioned. The Ghanaian team leader, Dr. Macarius Yangyuuru (The head of ARC) whom I trusted as my right-hand man, was the greatest counterpart, well undertaking and coordinating all local duties and affairs together with his subordinates and research colleagues including Mr. Acquah, D. and Mr. Quansahie, S. Heartfelt thanks again go to those persons. I am nothing more than a representative of them, and therefore greater part of the award presented must be shared among such cooperative members of the project team. Along with receiving this shared award, it was also an unexpected great honor for University of Ghana to have presented me “Certificate of Appreciation” under the name of Professor Clifford Nii Boi Tagoe, Vice-chancellor of the university, for my contributions to sourcing for research funds mostly from JSPS and to the technique of water harvesting for agricultural production in Ghana. The research project we carried out features including construction of a prototype irrigation scheme, which comprises a micro dam (irrigation tank), water conveyance channels and a piece of farm land (command area), in the purpose of the research of a tight budget. Such a construction-embedding research style in the field of water engineering is totally new, so too challenging and risky. It is, however, a strong need because empirically demonstrating methodology and feasibility of inexpensive development of the scheme is of central importance for evaluating the diffusion potential of the technique. I therefore believe that lessons from this project must be highly significant in a pragmatic sense.

For details of the project, readers should refer to the paper published (Kawachi, et al., 2005). The following is a brief description of the project.

Food scarcity in the 21st century would become most acute in Africa. In arid- and semi-arid countries, irrigation is the main option to significantly increase and stabilize food production. However, the overall rate of irrigated lands to arable lands in Africa is only around 6%, extremely lower than a worldwide rate of 17%. In the sub-Saharan countries, 48 out of the entire 53 African countries, the rate is reduced to 3.3%, and in the Republic of Ghana to 0.15%. FAO (1990) estimated that in the semi-arid and humid regions of Africa, rainwater harvesting technique can increase agricultural production in a million hectares in the short-term and 10 million hectares in the long-term. Nevertheless, during the last four decades, large-scale irrigation projects have received priority and attention, while small-scale projects have generally been neglected. One of the best ways to raise agricultural production in Africa with less experience of irrigation and less economic strength is considered to intersperse decentralized small-scale irriga-

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In order to test the efficacy of run-off farming rainwater harvesting in semi-arid savannah regions, we constructed the irrigation scheme in a wadi area, part of the grounds of ARC, as shown by an aerial photograph in Photo 1. The rainfall distribution pattern in the study site within a year is bi-modal with annual rainfall of 700 to 1200 mm. Rainwater running off the slope of catchment at a dash in the event of torrential rains is collected and stored in the tank whose embankment was built across the wadi, for irrigation use in between major and minor rainy seasons, and even in dry season. For embanking the micro-dam of rock-fill type, surface clayey soils and underlying rocks, available in the site, were used as core and banking materials, respectively. Harvested water is withdrawn (Photo 1 (a)) and conveyed by gravity to the farm land via lined open canal (Photo 1 (c)), followed by earthen canals for furrow irrigation (Photo 1 (e)). The design discharge of H-shaped spillway (Photo 1 (d)) was taken on 100-year flood.

For central aim of the research, a system for automatically recording rainfall and reservoir water-level was installed to obtain the related data at intervals of 5 minutes. Through testing after the completion of the scheme, it was demonstrated that the tank irrigation was effective to increase and stabilize maize production. Over the whole country of Ghana, there are potentially a huge number of sites that have nearly the same topographical and geological features as the current project site, and therefore are suitable for cost-effectively developing gravity-fed irrigation tanks. It is thus considered that the present practice is capable of replication in other areas of Ghana as well as in semi-arid areas of Africa. Decentralized small-scale irrigation tanks could also be a core of village-level rural community to encourage agricultural activities as well as farmers’ communication. The overall construction works can be done by farmers themselves if properly supervised, but farmers’ capacity for participatory operation and maintenance of the irrigation scheme completed must be developed for its better and sustainable use. The tank may be environmentally-friendly serving as a biotope. Only two or three months after the first filling of our pilot tank, a variety of aquatic plants and animals (e.g., Photo 1 (b)) came to the impounded water, which is strong evidence that the tank is also contributable to the preservation of bio-diversity.

I have been involved, as a directorship, in administration of JRCSA since its foundation. Particular heavy responsibilities extended over consecutive nine years; six years of fiscal 1998 to 2003 (two terms) as an editor-in-chief of this journal and three years of fiscal 2004 to 2006 (one term) as a presidency of JRCSA. In these days, frustrated at my lack of ability while feeling the responsibilities of being in an important role, I was quite resolved to have any unsavory reputation as a result, whenever having matters to be managed. Thus I believe that the duties I owed were unsuitably discharged, failing to measure up to expectations of the JRCSA’s members. Blushing deeply at my own shiftlessness, I apologize to the entire membership for having been unable to fulfill my duties to perfection. Another part of this award must therefore be a tribute for spending times on regular and routine business, rather than for devoting to the evolution of JRCSA. Through my managerial tasks, especially associated with editorial works of perusing all the submitted articles, however, I could truly reconfirm that the rainwater-oriented approach to water issues, directed by the farsighted predecessors in the early 1990s as a JRCSA’s solid credo, was exactly right in the ongoing century called “water century”. It is only a redeeming point that I can here convey a message of this reconfirmation to all the members of JRCSA. The JRCSA’s line, addressing the issues of water of a common vital human need through tracing back to raindrop or rainwater, is undoubtedly universal and seminal. It is strongly expected that the young members who are to bear the destiny of JRCSA on their shoulders would be unceasingly active and challenging along this line.

References