

Suitability Assessment of Water Harvesting and Land Restoration in Catchment Comprising Abandoned Quarry Site in Addis Ababa, Ethiopia

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Abstract : Water resource management and land degradation are among the critical issues threatening the suitable livability of many cities in developing countries such as Ethiopia. Rapid expansion of urban areas and fast growing population has increased the pressure on water security. On the other hand, the large transformation of natural green cover and agricultural land loss to settlement and industrial activities such as quarrying is contributing to environmental concerns. Integrated water harvesting is considered to play a crucial role in terms of providing alternative water source to insure water security and helping to improve soil condition, agricultural productivity and regeneration of ecosystem. Moreover, it helps to control stormwater runoff, thus reducing flood risks and pollution, thereby improving the quality of receiving water bodies and the health of inhabitants. The aim of this research was to investigate the potential of applying integrated water harvesting approaches as a provision for water source and enabling land restoration in Jemo river catchment consisting of abandoned quarry site adjacent to a settlement area that is facing serious water shortage in western hilly part of Addis Ababa city, Ethiopia. The abandoned quarry site, apart from its contribution to the loss of aesthetics, has resulted in poor water infiltration and increase in stormwater runoff leading to land degradation and flooding in the downstream. Application of GIS and multi-criteria based analysis are used for the assessment of potential water harvesting technologies considering the technology features and site characteristics of the case study area. Biophysical parameters including precipitation, surrounding land use, surface gradient, soil characteristics and geological aspects are used as site characteristic indicators and water harvesting technologies including retention pond, check dam, agro-forestation employing contour trench system were considered for evaluation with technical and socio-economic factors used as parameters in the assessment. The assessment results indicate the different suitability potential among the analyzed water harvesting and restoration techniques with respect to the abandoned quarry site characteristics. Application of agro-forestation with contour trench system with the revegetation of indigenous plants is found to be the most suitable option for reclamation and restoration of the quarry site. Successful application of the selected technologies and strategies for water harvesting and restoration is considered to play a significant role to provide additional water source, maintain good water quality, increase agricultural productivity at urban peri-urban interface scale and improve biodiversity in the catchment. The results of the study provide guideline for decision makers and contribute to the integration of decentralized water harvesting and restoration techniques in the water management and planning of the case study area.

Keywords : abandoned quarry site, land reclamation and restoration, multi-criteria assessment, water harvesting

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