

# Preface

Watershed degradation due to soil erosion is considered a major challenge in Iran, despite the introduction of several projects aimed at mitigating this environmental menace. Issues related to technical and social complexities of the watershed projects are difficult to evaluate, in spite of lessons learned from past experiences. In order to address such challenges, it is essential to assess fundamental social and technical issues involved. Previous attempts using quantitative and qualitative evaluation methods separately had their strengths and weaknesses. Addressing this issue requires an integrated watershed management approach. This study presents an integrated model using technical and social approaches for the evaluation of the Kushk-Abad Basin (KAB) watershed projects in Iran. The study was conducted within an 85 km<sup>2</sup> zone of the KAB, which is a sub-basin of the larger Kardeh dam catchment. The study is aimed at evaluating socio-demographic and technical factors affecting KAB Watershed Management Program (WMP), taking into consideration pre-, present, and post-project scenarios, particularly on the land treatment efforts initiated by the Watershed Management Organization of Iran.

The social evaluation study was designed to determine the factors that affect the variation of the level of participation in WMP in Iran. In this regard, a conceptual model was developed to (1) identify characteristics that lead to the participation in WMP and (2) determine the factors that affect the variation of the level of participation. In each of the selected three villages within the KAB locality, 200 individuals were randomly interviewed using a structured questionnaire for assessment of their socioeconomic characteristics and participation in the various watershed management programs. The sample size used was based on the Cochran formula with a confidence level of 0.05. The respondents' level of knowledge, attitude, expectation, and satisfaction of previous watershed programs were examined against the level of participation. On the other aspect, the technical evaluation study examined watershed management and bioengineering processes of structures through measures implemented during operations.

Based on a series of statistical analysis from the use of chi-square, factor analysis, and regression, the results of the social evaluation study suggested significant relationship between knowledge, expectation, and attitude on WMP with participation among the villagers in KAB. The relationship between age, household size, number of sons after 15 years, and size of irrigated and rain-fed lands was positively correlated with watershed participation. The results of this study showed that the level of the respondents' knowledge on WMP was low, while expectation, satisfaction, attitude, and level of participation ranged from moderate to high.

Results from the technical evaluation study revealed that the double mass curve demonstrated significant changes to flow distribution, suggesting the effectiveness of check dams in mitigating basin runoff. With check dams affecting almost 35% of the basin area, runoff in KAB also shows a significant reduction in peak discharges from the flow duration analysis. Soil erosion and sediment loads were effectively contained by the check dams of different types including gabion, earth-fill, brush-wood, and loose-stone dams. From field measurements, as much as 37% of the sediment loads were stored behind these dams since their construction. Results of qualitative evaluation showed that WMP was effective on six variables (flood occurrence, river sediment transport, agricultural yield, well capacity, orchard, and live-stock). The study findings showed that all check dams (except brush-wood) were structurally in good order. Additionally, the relative performance for both seeding and seedling planting was good, while contour furrow was moderate, and tree and shrub planting were weak.

The findings further showed that land treatment techniques were largely check dams and bioengineering methods from seeding to tree planting to address the soil and water conservation objectives of watershed management. This study provided some theoretical and practical implications and recommendations on their participations in the Watershed Management Project. In summary, this work recommends that social exchange and reason theory are appropriate to explain the variations of participation level.

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Practices from Kushk-Abad Basin, Iran

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