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# Socio-Economic and Institutional Impacts of Watershed Development in Thanagazi Tehsil, Alwar District

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## Abstract

This paper examines the socio-economic and institutional outcomes of watershed intervention in Rajpura micro-watershed, Thanagazi Tehsil, Alwar District. The analysis is based on primary household information collected through questionnaires, personal interviews, informal discussions and field visits. A stratified random sample of 100 households was used to assess changes in annual income, asset formation, women's empowerment, gender equity, health and hygiene, community perceptions and socio-political awareness. Total annual income across the reported activities increased from Rs. 737,549 before intervention to Rs. 1,484,712 after intervention, with a reported overall change of 50.32%. The total value of household assets increased from Rs. 963,100 to Rs. 2,406,900, representing a reported change of 59.99%. Economic gains were accompanied by mixed social outcomes. Positive responses were recorded for changes in women's attitudes and behaviour (58%) and skill improvement (50%), but women's-group organization (8%), saving and credit programmes (10%), and inclusion of women's suggestions in watershed activities (22%) remained weak. Access to safe drinking water (97.67%) and family planning (97.44%) was high, whereas access to sanitation facilities was limited (28.57%). The findings demonstrate that watershed intervention improved income, assets and selected welfare indicators, but institutional continuity, women's decision-making and equitable participation remained inadequate. Long-term socio-economic sustainability requires functional community groups, gender-responsive planning, post-project institutional support and equitable access to programme benefits.

Keywords: annual income; household assets; women empowerment; gender equity; health; community participation; Rajpura; Thanagazi

## Introduction

Watershed development is expected to improve rural livelihoods by strengthening the natural-resource base and expanding

opportunities for production, employment and household welfare. Its socio-economic success, however, cannot be assessed only through physical conservation works. Changes in income, assets, access to services, women's participation, community cooperation and institutional continuity are equally important indicators of rural development. Rajpura micro-watershed provides an appropriate setting for assessing these relationships. Agriculture, wage labour, livestock, private service and household production contribute to the local economy, while women undertake substantial responsibilities in water collection, agriculture, dairying and fodder management. Watershed intervention may improve productive opportunities, yet benefits can remain uneven when community organizations are weak or when women and resource-poor households have limited influence over decisions (Choudhary et al., 2015).

The paper therefore focuses exclusively on household and community outcomes. It evaluates whether intervention increased annual income and asset values, whether women's empowerment and gender equity improved, and whether welfare and socio-political conditions advanced. Environmental and agricultural land-use analysis is outside the scope of this paper (Grewal, 2017).

## Literature Review

Participatory watershed research emphasizes that conservation investments become sustainable when local resource users participate in planning, implementation, benefit sharing and maintenance. Mishra (1997) documented the importance of participation in watershed management, while Yogesh Kumar Bhatt et al. (1998) stressed the formation and strengthening of farmer organizations. Sheena and Mishra (1998) linked watershed development with community mobilization and collective action (Grewal, 2024).

Socio-economic evaluations have reported improvements in productivity, employment and household income, although the distribution of benefits differs among landholders, labourers, women and livestock-dependent families. Deshpande and Rajasekaran (1997) highlighted both programme impacts and implementation issues. Dhyani et al. (1997) demonstrated the value of socio-economic analysis in participatory watershed assessment, and Kerr et al. (1998) connected watershed development with the advancement of rainfed rural economies.

Institutional design influences who participates and who benefits. Chopra (1998) argued that technological interventions must be assessed together with institutional arrangements. Government guidelines similarly emphasize disadvantaged households and women as important beneficiary groups (Government of India, 1994). Accordingly, this paper treats income and asset gains as necessary but insufficient evidence and separately evaluates women's empowerment, health and community-level outcomes.

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## Methodology

**Research design** The study employed an analytical research design based on primary and secondary data. Primary information was collected through structured questionnaires, personal interviews, informal discussions and field visits. A sample of 100 households was selected from the Rajpura micro-watershed using the stratified random sampling method. Information was organized to compare conditions before and after watershed intervention and to examine household perceptions of social and institutional change (Raha et al., 2013).

**Variables and analysis** Economic variables included annual income from farm and off-farm activities and the value of dwelling houses, farm buildings, machinery, tools, vehicles and consumer durables. Social indicators included women's-group organization, saving and credit, participation in watershed decisions, income-generating programmes, behavioural change, skill development, gender equity, sanitation, drinking water, family planning, crime, social tension, economic perception and socio-political awareness. Frequency, percentage and before-after comparisons were used. Values are presented exactly as recorded in the field-survey tables; no inferential significance test or invented value has been added (Shunglu et al., 2022).

## Hypotheses

H1: Watershed intervention has increased household income and the value of household assets in Rajpura.

H2: Watershed intervention has strengthened women's empowerment and gender equity.

H3: Watershed intervention has improved health access, community welfare and socio-political awareness.

## Analysis and Results

### Hypothesis 1: Household income and asset formation

| Activity | Before intervention (Rs.) | After intervention (Rs.) | Change (%) |
|---|---|---|---|
| Dry-land agriculture | 136,560 | 192,700 | 29.13 |
| Irrigated agriculture | 156,789 | 225,000 | 30.32 |
| Orchard crops | 8,000 | 10,000 | 20.00 |
| Livestock, dairy and other activities | 153,000 | 235,012 | 34.90 |
| Agricultural labour | 102,200 | 187,000 | 45.35 |
| Other labour | 80,000 | 120,000 | 33.33 |
| Service/private | 100,000 | 500,000 | 80.00 |

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| Activity | Before intervention (Rs.) | After intervention (Rs.) | Change (%) |
|---|---|---|---|
| Self-employment/household production | 1,000 | 15,000 | 93.33 |
| Total | 737,549 | 1,484,712 | 50.32 |

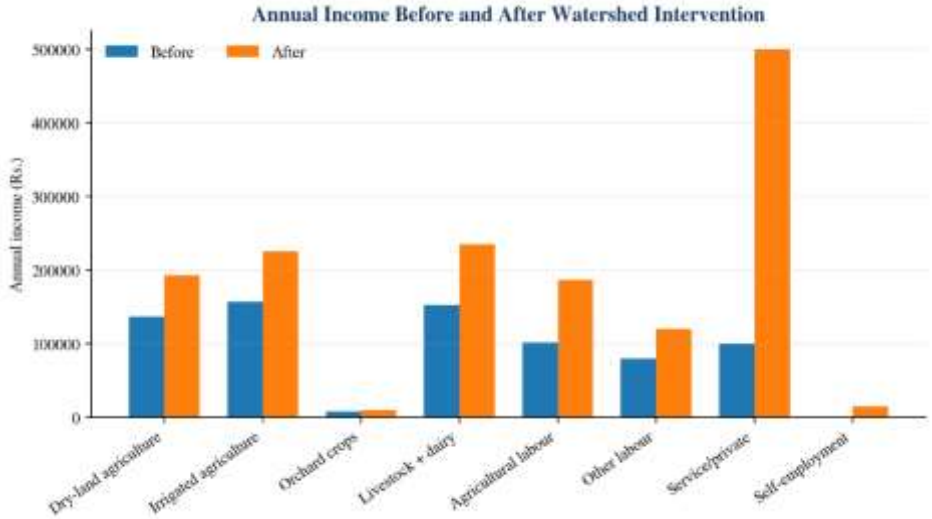



**Figure 1. Annual income before and after watershed intervention**

The reported total annual income increased from Rs. 737,549 to Rs. 1,484,712, with an overall change of 50.32%. Every activity recorded an increase. The largest reported percentage changes occurred in self-employment and household production (93.33%), service/private work (80.00%) and agricultural labour (45.35%). These results indicate diversification of income sources rather than dependence on a single activity.

**Table 2 Development of household assets in Rajpura watershed**

| Asset | Number | Before value (Rs.) | After value (Rs.) | Change (%) |
|---|---|---|---|---|
| Dwelling house | 43 | 456,800 | 1,696,100 | 73.07 |
| Farm buildings | 42 | 41,200 | 157,400 | 73.82 |
| Farm machinery | 1 | 12,000 | 14,000 | 14.29 |
| Farm equipment and tools | 5 | 45,000 | 51,200 | 12.11 |

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| Asset | Number | Before value (Rs.) | After value (Rs.) | Change (%) |
|---|---|---|---|---|
| Vehicles | 41 | 256,600 | 326,200 | 21.34 |
| Other consumer durables | 15 | 151,500 | 162,000 | 6.48 |
| Total | 142 | 963,100 | 2,406,900 | 59.99 |

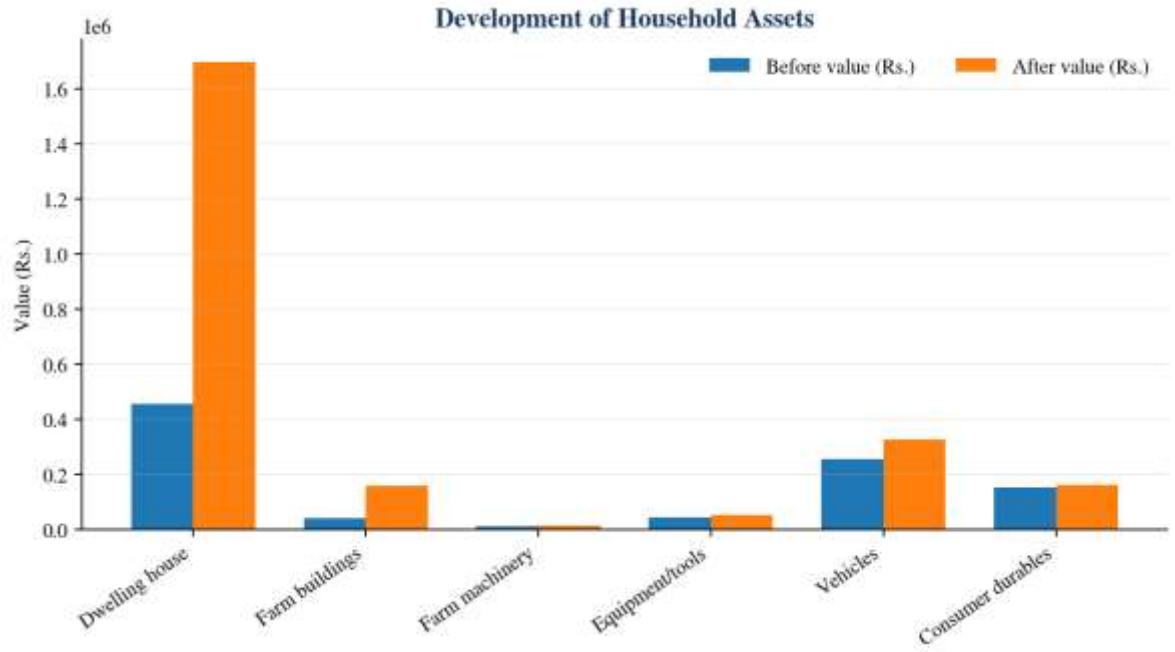



**Figure 2. Development of household assets**

The total reported asset value increased by 59.99%. Dwelling houses and farm buildings recorded the strongest percentage increases, at 73.07% and 73.82%, respectively. The results support H1: watershed intervention was associated with higher annual income and asset accumulation. However, lower growth in machinery, tools and consumer durables suggests that gains were concentrated in selected asset categories.

## Hypothesis 2: Women's empowerment and gender equity

**Table 3: Women empowerment indicators in Rajpura watershed**

| Activity | No: value | No (%) | Yes: value | Yes (%) |
|---|---|---|---|---|
| Organizing and strengthening women's groups | 46 | 92 | 4 | 8 |
| Saving and credit programmes | 45 | 90 | 5 | 10 |
| Inclusion of women's suggestions | 39 | 78 | 11 | 22 |
| Income-generating programme | 33 | 66 | 17 | 34 |

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| Activity | No: value | No (%) | Yes: value | Yes (%) |
|---|---|---|---|---|
| Changes in attitude and behaviour | 21 | 42 | 29 | 58 |
| Skill improvement/training | 25 | 50 | 25 | 50 |

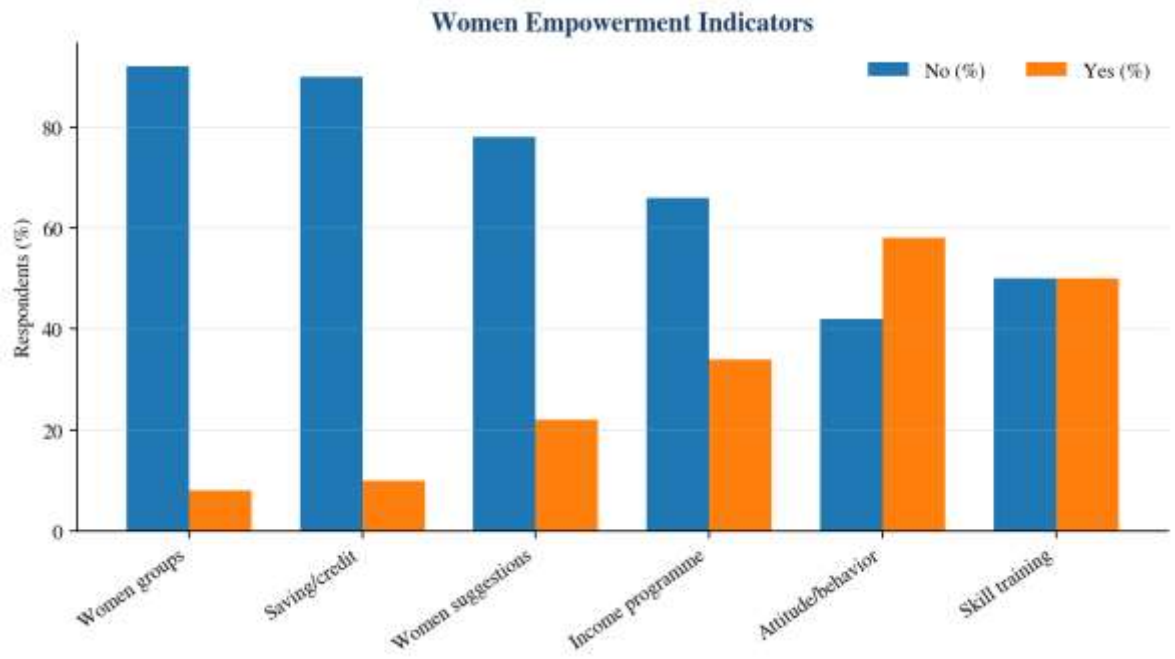



**Figure 3. Women empowerment indicators**

Women's empowerment results were mixed. Positive responses exceeded negative responses only for changes in attitude and behaviour (58%). Skill improvement was evenly divided at 50%. Institutional indicators remained weak: only 8% reported women's-group organization, 10% reported saving and credit programmes, and 22% reported inclusion of women's suggestions in decisions concerning tree species, fuel lots and check dams.

**Table 4: Perceived impact on gender equity**

| Dimension | Up to 20%: value (%) | 20%-60%: value (%) | Above 60%: value (%) |
|---|---|---|---|
| Equity in education | 4 (8) | 41 (82) | 0 (0) |
| Equity in wages | 18 (36) | 25 (50) | 1 (2) |
| Equity at home | 4 (8) | 41 (82) | 0 (0) |
| Equity in society | 16 (32) | 29 (58) | 0 (0) |

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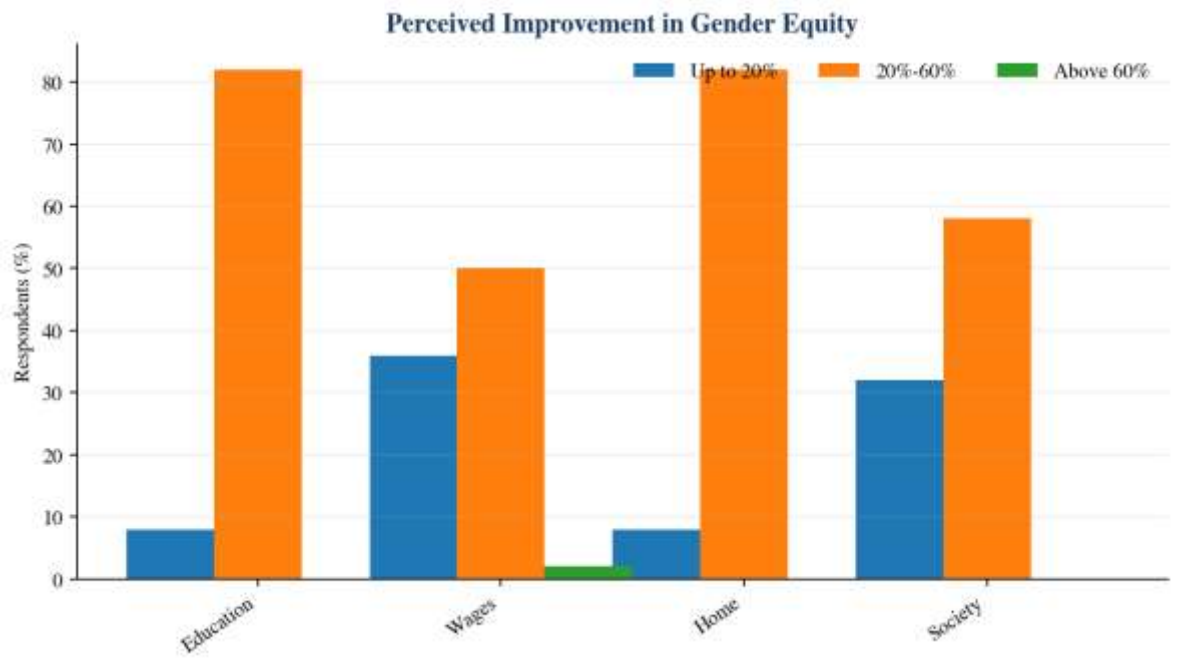



**Figure 4. Perceived improvement in gender equity**

Most responses placed improvements in education, home and society within the middle category of 20%-60%. Only wage equity received any response in the above-60% category, and this was limited to 2%. H2 is therefore only partially supported. Attitudes, skills and moderate equity indicators improved, but women's organizations, financial programmes and participation in decisions remained inadequate.

## Hypothesis 3: Health, community welfare and socio-political outcomes

**Table 5: Health access and social tension indicators**

| Indicator | Positive/Increase: value (%) | Negative/Decrease: value (%) | No change: value (%) |
|---|---|---|---|
| Access to sanitation facility | 6 (28.57) | 15 (71.43) | - |
| Access to safe drinking water | 42 (97.67) | 1 (2.33) | - |
| Family planning | 38 (97.44) | 1 (2.56) | - |
| Control on crime: increase/decrease/no change | 25 (59.52) | 1 (2.381) | 18 (42.86) |
| Social tension over water: increase/decrease/no change | 25 (59.52) | 0 (0) | 19 (45.24) |

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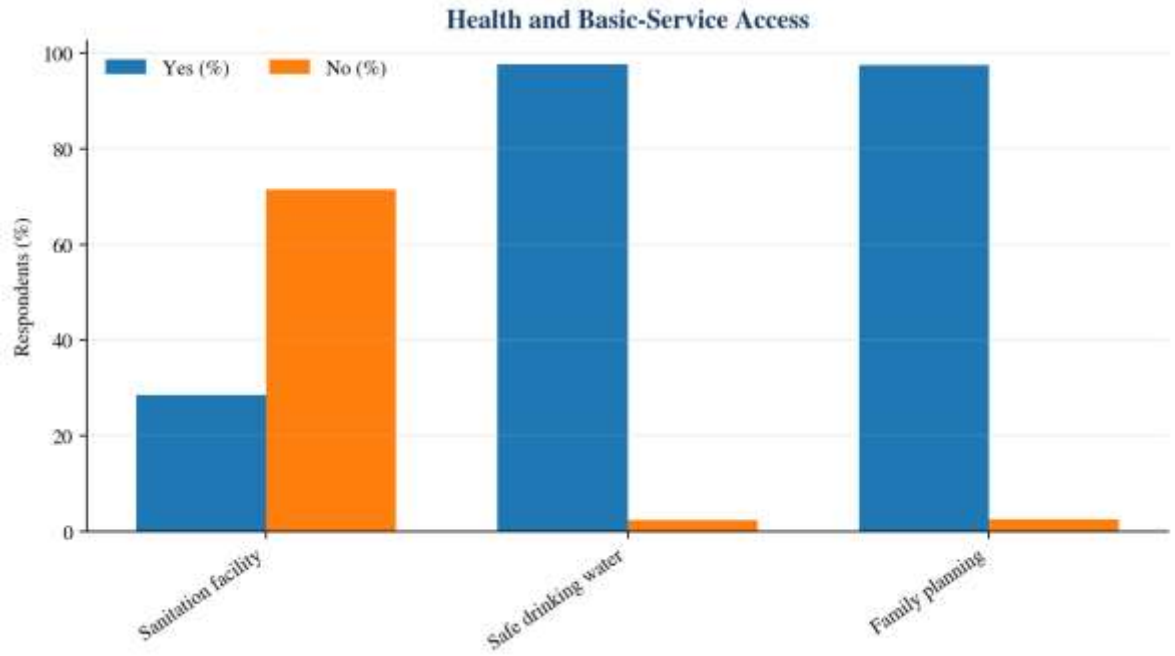



**Figure 5. Health and basic-service access**

Access to safe drinking water and family planning was reported by more than 97% of respondents, whereas only 28.57% reported access to sanitation. The crime and water-sharing results were less favourable: 59.52% reported increases in crime and social tension related to sharing water. Welfare gains therefore coexisted with unresolved social pressures.

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**Table 6: Community perception of economic impact**

| Economic indicator | Up to 20%: value (%) | 20%-40%: value (%) | Above 60%: value (%) |
|---|---|---|---|
| Agricultural production | 42 (84) | 1 (2) | 0 (0) |
| Fodder production | 44 (88) | 0 (0) | 0 (0) |
| Livestock population | 42 (84) | 1 (2) | 0 (0) |
| Milk production | 43 (86) | 1 (2) | 0 (0) |
| Employment opportunities | 38 (76) | 1 (2) | 0 (0) |
| Labour wages | 38 (76) | 1 (2) | 0 (0) |
| Impact on migration | 38 (76) | 1 (2) | 0 (0) |
| Price of land | 41 (82) | 0 (0) | 1 (2) |
| Economic status of villages | 34 (68) | 2 (4) | 0 (0) |
| Land under double crops | 20 (40) | 3 (6) | 19 (38) |
| Additional cultivated area | 20 (40) | 0 (0) | 4 (8) |

**Table 7: Socio-political outcomes in Rajpura watershed**

| Indicator | Up to 20%: value (%) | Up to 40%: value (%) | Above 60%: value (%) |
|---|---|---|---|
| Impact on education | 2 (4) | 42 (84) | 0 (0) |
| Natural-resource awareness | 3 (6) | 41 (82) | 0 (0) |
| Awareness among women | 11 (22) | 33 (66) | 0 (0) |
| Cleanliness and hygiene awareness | 15 (30) | 27 (54) | 2 (4) |
| Decrease in social discrimination | 12 (24) | 30 (60) | 2 (4) |
| Tendency to work together | 16 (32) | 25 (50) | 2 (4) |
| Working efficiency of community | 14 (28) | 28 (56) | 1 (2) |

Community responses were concentrated in the lower and middle impact categories. Education and natural-resource awareness each received more than 80% of responses in the middle category, while high-category responses were generally absent or limited to 2%-4%. H3 is partially supported: drinking water, family planning, education and awareness improved, but sanitation, crime, social tension and the limited magnitude of institutional change prevent an unqualified acceptance.

## Discussion

The income and asset evidence demonstrates substantial economic advancement. Increased earnings across farm, labour, service and self-employment activities indicate that watershed-linked rural development can influence multiple livelihood channels. Growth in dwelling houses and farm buildings also shows that part of the income gain was converted into longer-term household assets.

Economic progress did not automatically create strong participatory institutions. Women reported improvements in attitudes and skills, but group organization, savings programmes and influence over watershed decisions remained limited. This finding supports the institutional literature, which argues that local organizations require continuing facilitation and cannot be sustained through physical intervention alone (Chopra, 1998; Mishra, 1997).

Health and community outcomes were similarly uneven. Safe drinking water and family-planning access were strong, but sanitation remained deficient. Reported increases in crime and water-sharing tension reveal that additional or improved resources may still generate conflict when allocation rules are weak. Community monitoring, transparent benefit sharing and accessible dispute-resolution mechanisms are therefore essential.

The concentration of economic and socio-political responses in lower and middle categories suggests that aggregate financial gains should not be equated with deep institutional transformation. Sustainable development requires women's groups, savings and credit linkages, representation of landless households, skill follow-up and institutional arrangements for maintenance and equitable benefit distribution.

## Conclusion

Watershed intervention in Rajpura was associated with substantial growth in annual income and household assets. H1 is supported by increases across every reported income activity and by a 59.99% increase in total asset value. H2 is partially supported because attitudes, skills and moderate gender-equity indicators

improved, while women's organizations, financial programmes and decision-making participation remained weak. H3 is also partially supported: drinking water, family planning, education and awareness improved, but sanitation access, crime, social tension and limited high-level socio-political change remained concerns.

The results demonstrate that economic gains are strongest when accompanied by durable social institutions. Future intervention should establish functional women's and user groups, strengthen savings and credit, ensure representation in decisions, expand sanitation, monitor the distribution of benefits and maintain post-project support. These measures are necessary to convert short- and medium-term economic improvements into inclusive and sustainable rural development.

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