SOCIAL SCIENCE REVIEW ARCHIVES
ISSN Online: 3006-4708
ISSN Print: 3006-4694
https://policyjournalofms.com

Role of Small Dam's in Sustainable Livelihoods

Kainat Khan [1], Rabia Jawed [2]

[1] Mphil Scholar, Department of Anthropology, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi
[2] Co responding Author, Department of Anthropology, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi
Corresponding Author: **Kainat Khan** Email: kainat7736378@gmail.com

DOI: https://doi.org/10.70670/sra.v3i2.671

Abstract
This research explores the role of small dams in promoting sustainable livelihoods with a specific focus on Chora Sharif a rural area in District Attock, Punjab Pakistan. Small dams have emerged as crucial infrastructure in semi-arid regions for improving water availability supporting agriculture and enhancing income sources. Results show that the small dam in Chora Sharif has improved groundwater recharge animal growth and agricultural productivity. Additionally these dams created jobs and varied sources of income for the peoples who are particularly small-scale farmers. But there were also problems including uneven water distribution is low community involvement and poor upkeep. In order to guarantee the long-term advantages of small dam projects the study highlights the significance of inclusive governance, routine maintenance and community involvement by taking small initiatives the results will be long-term and fruit full as well. These observations can guide future planning and policy initiatives that use water resource management to promote sustainable rural development.

Keywords: Small Dams, Sustainable Livelihoods, Rural Development, Water Resource Management, Chora Sharif, Attock, Agriculture, Groundwater Recharge, Community Participation, Livelihood Diversification.

Introduction

Access to reliable water resources is crucial for rural development and livelihoods in many parts of the Global South. Small dams have become more significant in increasing the amount of water available for home, agricultural and livestock uses because of their adaptability for decentralized administration and comparatively low costs (Ogilvie et al., 2016). Particularly in semi-arid and dry regions like some regions of Pakistan, these small-scale water facilities are crucial for improving local resilience and reducing the negative consequences of climate variability (McCartney & Smakhtin, 2010). However managing water in these areas remains a challenging task. Its defining traits are frequently ineffective institutional frameworks low levels of community involvement and unequal access (Adams et al., 2018).

Research indicates that empowering farmers and including them in water governance initiatives might lead to more sustainable and equitable results (Meinzen-Dick & Nkonya, 2007). Furthermore the idea of numerous uses water services (MUS) highlights the necessity of developing water systems that support a variety of uses from domestic use to farming, which is

especially crucial for rural residents (van Koppen et al., 2017). Minor dams however might potentially have serious issues.

Sedimentation is a major problem that typically lowers storage capacity and efficacy over time (Chien et al., 2019). Similarly the level of community involvement, maintenance and institutional support have all been important factors throughout the inconsistent success of rural agricultural irrigation schemes (Fanadzo et al., 2010). However these systems have the potential to greatly reduce poverty and enhance food security when correctly implemented (Lipton et al., 2003).

This project aims to investigate how small dams support sustainable lifestyles in the rural village of Chora Sharif located in Pakistan's Attock District. By analyzing the benefits and drawbacks of minor dam projects this study contributes to a larger knowledge of how micro reservoirs and governance solutions could boost rural resilience and foster socioeconomic growth. It also highlights the need for future minor dam projects to take community priorities, environmental sustainability and governance improvements into account (Shah et al.).

Literature review

Many of the studies stressed on the importance of small dams because these dams help to increase the agricultural productivity. Small-scale water storage devices that greatly enhance irrigation allow farmers to grow agricultural crops rather than during the rainy season (Lipton et al., 2003). Higher household earnings, better nutrition and more food production result from this. By encouraging crop diversity Fanadzo et al. (2010) found that small dams assist farmers in producing high-value cash crops that enhance economic resilience.

Groundwater recharge depends on small dams because they allow water to seep into aquifers and reduce surface runoff. By maintaining water availability during dry seasons small dams reduce the demand on deep groundwater supplies per a 2010 study by McCartney and Smakhtin. By producing microhabitats for both terrestrial and aquatic species they also halt soil erosion and contribute in the maintenance of biodiversity (Ogilvie et al., 2016).

The favorable economical consequences of minor dams are well established. By generating employment in the building, fishing and agricultural sectors these structures support the general development of rural areas (van Koppen et al., 2017). Small dams also contribute to reducing rural poverty by supplying water for a range of livelihood activities such as livestock rearing and the agro-processing industry. Furthermore small dams improve the availability of water in homes and reduce the time and effort required to obtain it particularly for women and children (Meinzen-Dick & Nkonya, 2007). The health of rural communities is improved by increased access to water because it enhances cleanliness and reduces the incidence of waterborne diseases.

Despite their benefits small dams have disadvantages such as alluviation, costly maintenance and water allocation issues. In accordance with Chien et al. (2019) alluviation lowers minor dams storage capacity which impacts their long-term function. Similarly the study by Randall Adams et al. (2018) emphasizes governance problems where disputes among water users and wasteful use result from a lack of participation in the community in water management. Researchers stress on the value of integrated watershed management routine maintenance and community-based water governance in order to improve the environmental sustainability of small dams (Shah et al., 2009). According to van der Zaag and Gupta (2008) ensuring stakeholder involvement in decision-making processes can lead to a more efficient and unbiased distribution of water.

Methodology

From the systematic literature review (SLR) technique help to evaluate the bias of small dams sustainability in rural livelihoods specifically focused on the region Chora Sharif District Attock. Reading this assemble review process to achieve a collaboration current in the academic intuition by providing a non-segregatation of small scale water infrastructure communities with socio-

economic factors of rural areas that particularly depends on agricultural land and the of natural resources management.

The main focus of this assessment was to evaluate the effectiveness of small dams in betterment of local living conditions and to focus at how they fit with in this larger rural development projects. Rather than concentrating fair minded technical aspects the study focused qt how these initiatives increase community resilience, allows for livelihoods diversification and encourage equitable accessibility of resources that are water and cultivable land. This targeted approach permit for the involvement of contents that focus on socio-economic element of rural areas affected by small-scale water infrastructure.

The papers were selected based on their methodological rigor, contextual significance and depth of analysis. From the first twenty-five academic articles ten were selected for analysis. To make sure that both conceptual ideas and practical results were covered these reporting used a range of methodologies from the examination of theory to actual case studies. A review concerning about the themes was used to identify important concepts and recurring themes from the chosen literature. The main themes included changing in household income, increased irrigation access crop yeild and local government changes in regards to water resources management.

This study attempts to recast minor dams as complex socio-technical systems rather than merely infrastructure projects by incorporating multidisciplinary knowledge from disciplines including ecological anthropology, water governance and rural development. The findings demonstrate that with the right management, small dams can be catalysts for enhancing lives, promoting economic stability and strengthening environmental resilience in underserved rural communities.

Finding and Results

1. Economic Impact

Most participants reported a significant increase in the agricultural productivity after construction of the small dams. Farmers were more productive because they could fertilize their crops more effectively with a reliable supply of water. The consistent supply of water also promoted small-scale fishing and help to improved management techniques.

These programs help to boost-up local economies by diversifying revenue streams and enhancing food security. Increased the water availability and permit for more efficient crop preparation and year round farming which improved household incomes and generated a strong foundation for a long time rural livelihoods.

2. Employment and Livelihoods

Throughout the construction phase of the dam a number of temporary job opportunities were created as well labor and development related positions. At the point dam was completed agriculture, aquaculture and livestock management might generate long term income streams.

The availability of water allowed for cultivation of Larger regions and greater range of crops. Earlier on reliant seasonal labor families now have secure source of income. By elevate living standard and decreasing the inclination to move to cities in search of job this change helped to stabilize the rural workers.

3. Challenges Identified

Despite the advantages several challenges were noted. When it came to distribution of water it appeared that prosperous land-laord were given preference which limtize the small-scale farmer access. This inequality irritated many and rises concerns about equity.

Moreover issues like silt accumulation brought on the insufficient maintenance steadily decreased that dams effectiveness. One of the main concern was absence of involvement in the community involvement and awareness of the dam's maintenance and administration. Their sense of accountability and ownership for the dam's upkeep was weakened by the fact that many respondents felt left out of decision-making procedures.

4. Governance and Policy

There were differing opinions about the government's involvement in dam management. Many were irritated by the following neglect especially with regard to upkeep and equitable water distribution even though some people valued the early efforts made during building.

There were few mechanisms in place to guarantee local involvement in governance which hindered community participation. In order to ensure the long-term sustainability and viability with small dams in rural areas respondents said that stronger regulations, frequent oversight and participatory management techniques are required.

Conclusion

From this study we concluded that role of small dams play an very important and supporting role in sustainability of rural livelihoods like the area Chora Sharif Attock. This finding discloses the role of small dams have positive impact on agricultural land and the productivity increased as well they enhanced the groundwater recharge and it's contribution form the diversification of the income sources through fisheries and livestock farming. Farmers can now grow crops more efficiently and raise household earnings because to the availability of dependable irrigation water which has decreased reliance on unpredictable rains.

Furthermore small dams have created both direct and indirect employment opportunities during their construction, maintenance and through related economic activities. However several challenges persist including water distribution inequalities, limited community participation, sedimentation and inadequate maintenance mechanisms. These factors can limit the long-term benefits of small dams if not properly addressed.

Government policies and community involvement emerged as crucial for the successful management and sustainability of small dam projects. Active engagement of local stakeholders in decision-making and equitable water governance can enhance the socio-economic impact and ensure the sustainability of small dam initiatives.

This research contributes valuable insights into the intersection of water infrastructure and rural development emphasizing the need for improved governance continuous monitoring and inclusive planning in future small dam projects.

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