

# Irrigation System (Kuhl) in Himachal Pradesh

## Problems of Declining Kuhl Irrigation System : A case of Neugal Watershed , Palampur And Its Modern Solution For Helping Agriculture

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**Abstract-**Sustainable agricultural production largely depends on the proper development, conservation, and efficient utilization of irrigation resources at the micro level. In Himachal Pradesh, diverse geographical conditions have led to the adoption of traditional irrigation systems known as Kuhls, which play a vital role in supporting agriculture and rural livelihoods. Kuhls are narrow, manually constructed surface channels that divert water from natural streams and ravines through gravity flow to irrigate terraced fields. These systems, built mainly with local materials such as river boulders and soil, represent an eco-friendly and community-managed method of irrigation. Despite their historical and agricultural significance, Kuhls today face several challenges including structural deterioration, water losses, changing climatic conditions, and inadequate maintenance. The present study focuses on the Palampur region of Himachal Pradesh to examine the problems associated with traditional Kuhl irrigation and explore modern solutions for improving irrigation efficiency and agricultural sustainability. The study highlights the need for technological improvements, conservation measures, and integrated water management practices to preserve this traditional irrigation heritage while meeting present-day agricultural demands.

**Keywords:** Kuhl Irrigation, Sustainable Agriculture, Himachal Pradesh, Palampur Region, Traditional Irrigation System, Water Resource Management, Irrigation Efficiency, Terraced Farming, Rural Agriculture, Sustainable Water Conservation.

## I. INTRODUCTION

Sustainability in agricultural production depends considerably upon proper development, conservation and optimum use of irrigational facilities at micro-level. In Himachal Pradesh, wide variation in geographical features calls for the need to adopt different systems for development of irrigation resources in the state. However, the irrigation system that has traditionally prevailed has been through Kuhls, which are respected as lifelines of farmers in the state. These Kuhls are nothing but narrow, man-made surface channels (generally kachcha structure) which gravitationally divert water from naturally flowing streams and ravines (khuds and nullas). The system consists of a temporary headwall, constructed usually with river boulders across a khud for storage and diversion of the flow through Kuhl to the fields. By modern standards, constructing Kuhl was simple, with boulders and labour forming the major input. The Kuhl was provided with kuchcha outlets, called moghas to draw out water and irrigate nearby terraced fields. The water would flow from field to field and surplus water, if any (especially during kharif season), would drain back into the khud.

**The present study pertains to the Palampur region, which represents problems of kuhl irrigation and its modern solution to support agriculture.**

## II. IRRIGATION METHOD USED IN HIMACHAL PRADESH

In the Northern State of Himachal Pradesh traditional irrigation methods such as canals (kubls) have been built by local residents to draw water from the small streams that originate from hill springs. CANAL:- There are several major canals in the state including the Bhakra canal, the Giri canal, and the Beas-Satluj link canal. These canals supply water to the fields through a network of smaller channels. Rivers:- The state is also blessed with several rivers, including the Beas, Sutlej, and Chenab, which are used for irrigation purposes. Many farmers use small-scale irrigation systems, such as sprinklers and drip irrigation, to extract water from rivers. Springs:- Himachal Pradesh has numerous natural springs that are used for irrigation. These springs are often channeled into small reservoirs, which supply water to nearby fields. The state government has undertaken several initiatives to improve irrigation infrastructure and water management in the state. For instance, the government has constructed check dams and small reservoirs to store water during the monsoon season. It has also promoted the adoption of efficient irrigation technologies, such as drip irrigation, to conserve water.

### 1.7 PRESENT STATUS OF KUHLL IRRIGATION SYSTEM IN HIMACHAL PRADESH

Changes in the past few decades have posed a challenge to the functioning of the kuhl. This includes a sharp decline in dependence on agriculture and out-migration. This has resulted in the fall in available collective labour to perform annual maintenance tasks and the general interest in the maintenance of the kulis. In the recent years, the government has started to manage these structures and construct them out of concrete. Apart from making the repairs to damages costlier and unaffordable to the people of the valley, it has made it difficult to divert the canal according to changing needs. The cementing on the kuhl is executed through MNREGA program. The villagers participate in this for the wages, despite being in disagreement with the cementing of the kulis. In many villages, the Department of Irrigation and Public manages the khul.

**Formation of Kuhl Committees (or Water Users Associations, WUAs):**

Most of the Kuhl regimes which experienced declining participation, increasing inequalities and declining watermaster’s authority have changed their operating rules and have formalised Kuhl’s governance structure through the creation of Kuhl Committees by the farmers constituted these committees with three basic points in mind:

1. To strengthen the declining authority of the water-master (by providing a set of rules for resolving conflicts among irrigators, especially under conditions of water scarcity),
2. To boost the declining effectiveness of rules (by way of imposing fines to the defaulters) regarding labour contribution for Kuhl maintenance and repair [ In respect of a number of Kuhl Committees, the fine system has effectively mitigated against the pull of non-farm employment] , and
3. To procure government grants for maintenance and repair of Kulis in an effective manner. Undoubtedly, a Kuhl regime with a duly constituted committee (with local elites/skillful members representing different sections) can acquire government funds much more effectively (due to its accountability to government agencies) than an individual Kohli, who is generally less skillful/ educated, and is much less accountable to the civil administration.

**III. DATA AND PROBLEMS WE ANALYSIED AND WORK UPON AND STUDY**

<b>1)</b> <b>Hydrol</b>	Declini ng dischar	Reduce d water in	Decre asing river	Drying up of canals
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<b>ogical and Water Avilability Problems</b>	ge in canals during winter	dongs and rivers	levels throug hout the year	during critical crop months
<b>2) Structural and Physical Problem of Kuhl Networks</b>	Frequen t breachi ng of bandhs during heavy rain	Canal embank ments collaps e due to weak soil	Sudde n floods wash away intake points	High silt load in canals
<b>3) Environment and Ecologi cal Problems</b>	Decline in rainfall	Irregula r monsoon timing	Increa sed variabi lity in season al precipi taion	Forest degradat ion reducin g ground water recharge
<b>4) Agricul tural product ion proble ms</b>	Reducti on in paddy product ion	Decline of maize and wheat product ion	Reduc ed vegeta ble output	Withdra wl of autum paddy
<b>5) Socio-Econo mic and Demog raphic Proble ms</b>	Water conflict s among farmer	Conflic ts betwee n head reach and tail end farmers	Tensio n over irrigati on turns and schedu les	Outmigr ation reducin g availabil ity of labour
<b>6) Institut</b>	Weakin g of traditon	Poot enforce ment of	Irregul ar monin	Ineffecti veness of water

<b>ional and Governace Problems</b>	al kohli system	traditio nal rights	toring of kuhl networ ks	user Associat ions
<b>7) Land Use And Develo pment Pressur e Proble ms</b>	Encroac hment on traditio nal kuhl routes	Narrow ing of canals by buildin g walls ,	Road wideni ng damag ing canals	Jcb excavati on damagin g slopes and canals structur e
<b>8) Techno logical and Mainte nance Proble ms</b>	Lack of modern isation	Poorly designe d concret e lining projects	Irregul ar desiliti ng of canals	Poor quality off bandh construc tion due to lack of material s
<b>9) Ecologi cal and Livelih ood Proble ms</b>	Reduce d Green fodder due to water scarcity	Decline in livestoc k product ivity	Reduc ed house hold food self – suffici ency	Rise in food expendit ure due to low producti on
<b>10) Emergi ng Societal Proble ms</b>	Decline of traditio nal knowle dge of kuhl operatio n	Loss of custom ary rituals and norms of water use	Water diverte d for touris m	Waste disposa l near tourist areas blockin g canals

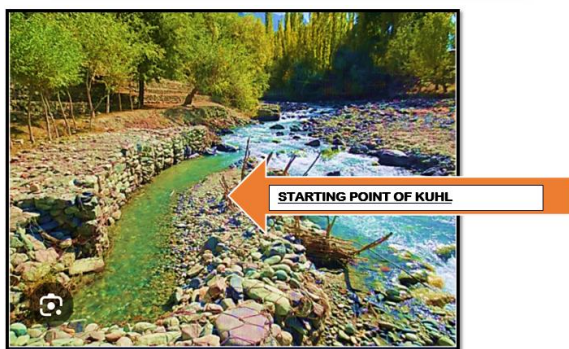




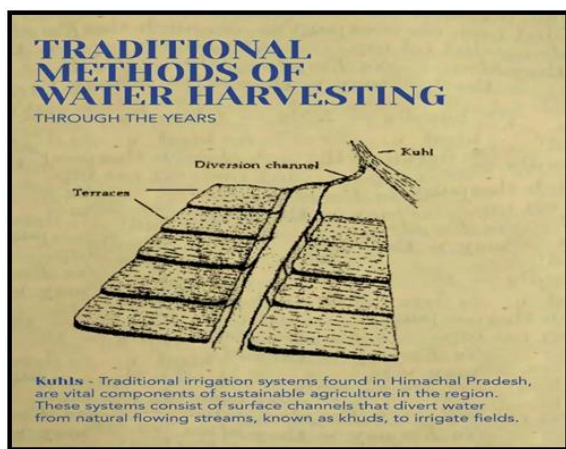
ecosystems along its course. The water from the Kuhls is also used to wash dishes, clothes and livestock and in instances when the tap water runs dry it is used for drinking purposes too. However, domestic dependence of the Kuhls have reduced considerably since the availability of tap water.

It also caters to other livelihoods to the communities and families that run the watermills (Gherats) and the shepherds (Gaddis). Since the water mills run without electric power and operate with the force of water, the community gets to grind grains at a really low cost. Systems of informality are prevalent here and often the Gherats are paid in grain when the families don't have money to pay for the services of the water mills .

## V. RESEARCH WORK FIELD SURVEY



To conclude in simple words, we defined field survey as the collection and gathering of information at local level by conducting surveys. It is also an essential part of geography as it provides opportunities for student to develop and expand their geographical knowledge. The field work should be part of geography curriculum and not added as a special activity. It enhances the understanding about pattern and spatial distribution and their relationship at the local level. Students also learn the skills like interviewing, good communication, local vocabulary, observing, sampling, data collection, data processing along with making and using questionnaires and maps through statistical method. As study area we chose Saperu , Panaper, Kusmal, Bandla, Mehnja Panchayats of Palampur tehsil of district Kangra, Himachal Pradesh. In Northern State of Himachal Pradesh traditional irrigation method is used such as Canals also known as kuhls. They have been built by local residents to draw water from small stream that originate from the hill springs. Kuhls are traditional systems of community managed, interconnected gravity flow irrigation systems of Kangra Valley in the western Himachal Pradesh region of India. Kuhls are small irrigation canals mainly seen in Himachal Pradesh.



## IV. FUNCTIONS

Since these canals are unlined they also recharge underground water through the areas it flows through seepage. They also support the growth of riparian

## V. METHODOLOGY USED

(Ground Work Primary Data Also Collected With This Secondary Data.)

### Death Of Kuhl Irrigation System Of Kangra Valley Of Himachal Pradesh ( In Rest Of Villages ) Following Factors Responsible :-

- 1) Service Sector Job ( People Left Their Job And Settle In Urban Areas)
- 2) Less Paraticipation Of Youths May Be Of Studies Or Strict Parents Etc
- 3) Absence Of Male Manpower For Night Gaurad
- 4) Entry Of Tractor In Hill Farming Distroy Kuhls
- 5) People Throw Garbage Openly In Kuhls Lack Of Civic Sense

## VI. CONCLUDING REMARKS (SUMMARY AND CONCLUSIONS)

Topographical, climatological agronomic, institutional and socio-economic factors are responsible for rendering the cultivation of paddy difficult and making it unproductive in kuhl command areas of Kangra valley. The abandonment of the paddy resulted in making the kuhl system non-functional. The revival efforts of these networks such as making kuhls concrete would prove futile unless sound system for promoting adequate people participation in ensuring the predictable supply of water in the kuhl network is developed. The technological interventions such as making head-works of two or three contiguous networks common in order to reduce the cost of maintaining three different head works as well as to impart storage capacity to the kuhls will help in maintaining a regular flow of kuhl water. The generation of storage capacity at headworks will also give rise to community aquaculture, water sports and non-farm employment. Khad-based major works require that there must be a platform to conduct inter-network interactions for encouraging people participation, discuss broad-based projects, and seeking grants. The use of ICT need to be explored for developing sound kuhl management system.

Village Saperu , Panaper, Kusmal, Bandla, Mehnja have good water connectivity even they use water technique for wheat to make floor etc. and have good water availability because they are near to mountains

and well connected networks but the areas that are far away form original river source or hill the network get block due to insufficient fund and lack of community management and garbage dumping problem . many people left primary sector but some are still purusing kuhl is made for community purpose if community not participate to save it it will automatically vanished etc. This is not just the part of our Agriculture or irrigation system this is also the part of our Tradition of Himachal Pradesh etc.

Problems of Declining Kuhl Irrigation System : A case of Neugal Watershed , Palampur And Its Modern Solution For Helping Agricutute :-

- 1) Cleaning that small stream
- 2) Making laws for kuhl irrigation system
- 3) Demand from govt authority to provide modern technique etc
- 4) Regular water supply when needed.
- 5) It will save electricity for agriculture fields etc
- 6) Fishing , washing clothes etc drinking water many uses of this water
- 7) Public awareness must needed
- 8) And community participation whether you are farmer or not etc
- 9) News must come in Newspaper TV so that everybody knows about this system
- 10) Even village children and town childerens must have to know about this try to put offline as well as online efforts for the betterment of society etc
- 11) Even in some villages govt also sponsored govt had made cement kuhls with Asian Technology etc.

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