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The findings from this study indicate an increased production and economic efficiency at the aggregate level with the emergence of alternative institutions, mainly because most of the alternative institutions cater to high-value non-paddy crops and use water seeping from canal for value addition which would have otherwise been wasted.

Water Policy Research

# Highlight

## Alternative Irrigation Institutions in Canal-Command

The Case of the Chalakkudy River Diversion Scheme in Kerala

Neetha N.

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# Alternative Irrigation Institutions in Canal-Command: The Case of Chalakkudy River Diversion Scheme in Kerala, South India<sup>1</sup>

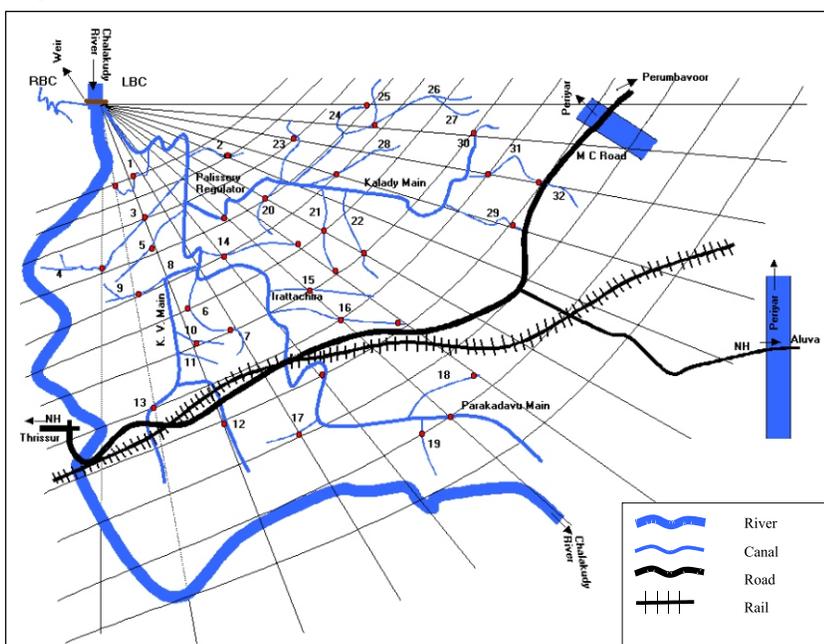
RESEARCH HIGHLIGHT BASED ON A PAPER TITLED:

“ALTERNATIVE IRRIGATION INSTITUTIONS IN CANAL-COMMAND: THE CASE OF CHALAKKUDY RIVER DIVERSION SCHEME IN KERALA, SOUTH INDIA”

Irrigation policy in developing countries faces serious challenges in terms of efficiency and sustainability. In India, massive investments have been made on the development and maintenance of large-scale irrigation projects to enhance agricultural production. However, poor performance of large-scale irrigation projects has opened up the need for institutional reforms in the management of canal irrigation. Despite generating substantial debates on alternative institutional solutions, the reforms introduced are largely confined to transfer of irrigation

management to user groups, neglecting the existence and possibilities of other institutions. In reality, a wide range of institutions with varied technologies and scales of operation are involved in the process of production and distribution of irrigation. A closer examination of various institutional alternatives and the reasons behind their emergence would enrich the understanding of institutional choice and hence contribute to the crafting of efficient institutions. With this backdrop, this study focuses on the institutional change in canal irrigation in the command area of *Chalakkudy* River Diversion Scheme (CRDS).

Figure 1: Survey Points in Chalakkudy Left Bank Canal System



The *Chalakkudy* River Diversion Scheme (CRDS) was the first major irrigation scheme commissioned in Kerala, during the first five-year plan to increase paddy production in the state. The scheme was partially commissioned in 1952 and completed in 1957. Among the two bank canals, the Left Bank Canal (LBC) was selected for conducting the study. To give representation to different locations--head, middle, and tail-end trajectories were drawn vertically and horizontally on the map of the project. The points of intersections in the figure were selected as survey points (Figure 1).

<sup>1</sup>Neetha N. is an Associate Fellow, National Labour Institute, NOIDA and Research Scholar, Centre for development Studies, Trivandrum. This Research highlight is the summary of the Ph.D. dissertation of the author titled 'Institutions in the Provision of Irrigation: The Case of Chalakkudy River Diversion Scheme in Kerala'. Author acknowledges the support from the IWMI/Ford Foundation Fellowship for South Asian Women for Doctoral Studies.

The research paper can be downloaded from the IWMI-Tata Website <http://www.iwmi.org/iwmi-tata>.

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We selected 35 intersection points were selected on 29 branches and the main canal. From each point, 6 households were selected randomly. Thus the total number of sample households is 210. The unit of analysis is individual plots rather than individual farmer, considering the possibility that a farmer can have multiple plots with different institutions. For the 210 households surveyed the number of sample plots was 474. Of these 474 plots, 77 were unirrigated. The findings of the primary survey were supplemented through discussions with farmers, farmer groups, local body members, irrigation department officials and other key persons.

From the field study it was evident that, since the late 1970s, major changes occurred in the cropping pattern in the *ayacut* resulting in significant decline in paddy and a sharp increase in the area under coconut, banana and plantain, arecanut, and nutmeg. Mixed cropping replaced mono cropping of paddy in the *ayacut*. By the mid 1980s rubber also acquired prominence among the crops. These shifts were more or less in line with the changes in the cropping pattern elsewhere in the state. The move towards non-food crops gained further momentum in the 1990s. Out of the 474 plots, only 175 had mono cropping (mostly paddy or rubber). Paddy is not the primary crop grown in the *ayacut*, neither in terms of number of plots nor in terms of area. It is prominent only in about one-fourth of the plots, with about 40 per cent of the area. Coconut occupies the principal position with 53 per cent of plots and 43 per cent of area. Rubber, plantain and banana, and vegetables are other important crops. The low proportion of plantain and banana, nutmeg, arecanut, and vegetables is because these crops are grown as mixed crops along with coconut.

The shift in the cropping pattern in favour of non-paddy crops has resulted in significant changes in the demand for irrigation. A major part of the irrigation is now for coconut and mixed crops, the requirements of which differ from that of paddy. Non-rice crops demand more stringent water control to ensure timely and intermittent water depending on growth stages and the mix of

crops grown. Further, for crops like nutmeg, coconut, and arecanut, failure in irrigation even for a short spell can lead to long-term loss in production and productivity. One important dimension of the changed cropping pattern is the shift towards rubber.

**Only 15 per cent of the plots studied were found depending solely on public provision, highlighting the prominence of alternative institutions in the canal command.**

The growing mismatch between the provisions of canal irrigation and the requirements of farmers has brought in responses towards modifying/improving the canal system or in crafting of alternative institutions. Apart from public provision, the major irrigation institutions found functioning in the command area of CRDS are: government initiated collective action; farmer initiated collective action; lift irrigation; water market; and private investment. Only 15 per cent of the plots studied were found depending solely on public provision, highlighting the prominence of alternative institutions in the canal command.

Farmers' choice of institutions is determined or constrained by several factors related to location, land-crop particulars, and personal characteristics. Multi-nomial logit model used to examine the relative roles of these factors in deciding institutional choice shows that distance from the main and branch canals, distance from the outlet, and elevation are significant locational factors. However, the relative significance of these factors varies across institutions. Locational variables are strikingly prominent in the case of the water market, with elevation having positive and significant relation implying that buyers of water are always disadvantageously placed. Elevation is also found to be influential in the choice of private investment, which could be seen as a strategic move of farmers to counter uncertainties arising out of locational disadvantages through investing in wells.

Among the land and crop characteristics, three variables – type of cropping, main crop, and land type were found to be crucial in the choice of

institutions. Mixed cropping induces farmers to strive for alternative institutions. The tendency to opt for alternative institutions with higher costs was found prominent in plots with non-paddy crops, confirming the profit driven behaviour of farmers. Occupation is significant in deciding institutional selection. Cultivator status showed a significant and positive relation with participation in collective action institutions and negatively related with private investment.

The sources of inefficiency in canal irrigation can be attributed to: (a) the characterisation of irrigation as a public good and (b) the institutional framework selected for distribution. Irrigation is an economic input appropriated by individuals for market-oriented private production. The characterisation of irrigation as a public good and the resultant under-pricing of water is largely based on the assumption that farmers will not be able to pay for irrigation services if competitively priced. However, in reality, farmers are willing to incur costs more than the irrigation cess as the incremental benefits of irrigation are high. The cost estimates across various institutions in the command area substantiate this.

The assignment of public good status to irrigation, given the existing inequalities in terms of land rights, may turn to be regressive than equitable. As the entitlement for irrigation is based on land rights, the objective of attaining distributional equity through public provision of canal water is debatable, given the unequal distribution of land holdings. Further, under-pricing and poor recovery of costs are questionable since most of the beneficiaries are from well-off sections of society and they receive direct benefits at the cost of the economy in general. This is evident from the fact that, among the 474 households we surveyed, only 15 percent are cultivators, who solely depend on agriculture. Thus, for a major chunk of beneficiaries, farm work is a part time activity. This does not mean that all cultivators are poor and require subsidized input, or that all non-cultivators are well-off. However, the substantially low proportion of farmers among irrigators is indicative of the

skewed and inequitable distribution of benefits to certain sections of society.

**Farmers' perception of excessively subsidised canal water as a public good induces them to maximise not the output per unit of water but water per unit of output. This leads to water misuse and wastage in the canal command.**

The highly subsidised and uniform pricing of irrigation across users itself raises serious concerns with regard to efficiency and sustainability. The institution of public provision does not allow the emergence of a mechanism to effectively capture and transmit either the scarcity value or the use value of water to farmers. Farmers' perception of excessively subsidised canal water as a public good induces them to maximise not output per unit of water but water per unit of output. This leads to water misuse and wastage in the canal command. Perceived uncertainties, as has been seen in the context of CRDS, prompt farmers to over-irrigate, resulting in inefficient use of scarce resources.

**The tenet of uniform pricing could be economically nonviable as the cost of delivering irrigation water differs across users depending on their positions in the canal command.**

Further, the tenet of uniform pricing could be economically nonviable as the cost of delivering irrigation water differs across users depending on their positions in the canal command. The cost of providing water to farmers at the head end is considerably less compared to those at the tail-end, as provision to the latter requires maintaining a large network of canals and distributaries. Here, fixing uniform cess would mean discriminatory pricing in favour of tail-enders. Economic rationale demands pricing of irrigation on the basis of the marginal costs of provision so as to recover the cost of operating the system, with tail-enders paying higher cess. Thus, in the absence of differential pricing, the sustainability of canal irrigation seems to be impossible, unless

mechanisms are built in to compensate financial liabilities arising from ideologically driven decisions.

The administration of the canal system further aggravates scarcity. Influential irrigators are found to intervene in the administration and often divert water at the cost of other farmers. The system of enforcement is also ineffective as otherwise punishable actions are ignored, or treated lightly. Frequent cases of spout destruction and illegal water diversion reported in CRDS do provide ample evidence of the systemic inefficiency in enforcement of equitable and efficient supply of water.

**The findings from the CRDS canal command are indicative of an increased production and economic efficiency at the aggregate level with the emergence of alternative institutions.**

The first and foremost concern in social efficiency comparison of failed public provision vis-à-vis institutional change (with alternative institutions) is productive and economic efficiency. The findings from the CRDS canal command are indicative of an increased production and economic efficiency at the aggregate level with the emergence of alternative institutions. Economic efficiency of new institutions is perceived to be higher if irrigation water is diverted for high-value use. Viewed in this perspective, in CRDS, the situation is certainly that of an improved aggregate economic efficiency, as most of the alternative institutions are found catering to non-paddy crops with higher profitability. Another argument in favour of increased economic efficiency is that almost all the alternative institutions harvest the otherwise wasted seepage water and divert it for value addition. All the alternative institutions in the canal command rely entirely on seepage water from surface irrigation, which would have otherwise been wasted in the absence of alternative institutions.

The existence of multiple institutions raises several concerns on the failure of public provision and its sustainability as an institutional option. This calls

for a review of the tenet that government is the right agency in the distribution of irrigation water and questions the ideology of subsidising irrigation on grounds of equity.

**As state has proved to be a failure in the distribution of water, it is appropriate to limit the state's involvement to production. Distribution efficiency can be ensured through the tapping of possibilities of market/private and user group efforts.**

The prime consideration in this context is to define the roles and domain of state in canal irrigation management. As state has proved to be a failure in the distribution of water, it is appropriate to limit its involvement to production. Distribution efficiency can be ensured through the tapping of possibilities of market/private and user group efforts, which can more effectively translate the irrigation requirements of the locality while deciding the distribution. Private/market solutions offer greater possibilities as they provide users to seek higher value applications for scarce water resources. Irrigation needs to be treated as an input in agricultural production which has an opportunity cost and has to be priced on marginal cost considerations that encourage more efficient resource use. Efforts could be directed towards efficient and conjunctive use of water through encouraging alternative institutions in the upper reaches leading to the diversion of canal water to peripheral areas.

In the absence of unspecified boundaries, entitlements, and property rights, market solutions are bound to raise ambiguities and conflicts, leading to increase in transaction costs. In this context, state intervention is required to define and regulate quantifiable and transferable property rights. The state should provide appropriate legal and institutional support in identifying, establishing, and negotiating water rights and in monitoring and regulating externalities. Thus, the solution lies in strengthening alternative institutions and crafting mechanisms to regularise and legitimise these alternatives to ensure efficiency, equity, and sustainability in irrigation management.

## IWMI-Tata Water Policy Program

The IWMI-Tata Water Policy Program was launched in 2000 with the support of Sir Ratan Tata Trust, Mumbai. The program presents new perspectives and practical solutions derived from the wealth of research done in India on water resource management. Its objective is to help policy makers at the central, state and local levels address their water challenges – in areas such as sustainable groundwater management, water scarcity, and rural poverty – by translating research findings into practical policy recommendations.

Through this program, IWMI collaborates with a range of partners across India to identify, analyse and document relevant water-management approaches and current practices. These practices are assessed and synthesised for maximum policy impact in the series on Water Policy Research Highlights and IWMI-Tata Comments.

The policy program's website promotes the exchange of knowledge on water-resources management, within the research community and between researchers and policy makers in India.

## IWMI-Tata WATER POLICY PROGRAM

Elecon, Anand-Sojitra Road  
Vallabh Vidyanagar, 388120, Gujarat, India  
Telephone: 91-2692-229311-12-13  
Fax : 91-2692-229310  
E-mail: [iwmi-tata@cgiar.org](mailto:iwmi-tata@cgiar.org)  
Website: <http://www.iwmi.org/iwmi-tata>



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HARVEST  
IWMI is a Futures Harvest Center  
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## HEADQUARTERS

127 Sunil Mawatha, Pelawatte, Battaramulla, Sri Lanka  
Mailing Address : P. O. Box 2075, Colombo, Sri Lanka  
Telephone : +94 1 787404,784080 ; Fax : +94 1 786854  
E mail : [iwmi@cgiar.org](mailto:iwmi@cgiar.org)

## REGIONAL OFFICE FOR ASIA

(Bangladesh, China, Nepal and Sri Lanka)  
127 Sunil Mawatha, Pelawatte, Battaramulla, Sri Lanka  
Mailing Address : P. O. Box 2075, Colombo, Sri Lanka  
Telephone : +94 1 787404,784080,1 ; Fax : +94 1 786854  
E mail : [iwmi-asia@cgiar.org](mailto:iwmi-asia@cgiar.org)

## CHINA

Center for Chinese Agricultural Policy,  
Chinese Academy of Sciences  
Building 917, Datun Road, Anwai, Beijing, 100 101, China  
Telephone : +86 -10 64889440,64856535,64856837  
Fax : +86 -10 64856533  
E mail : [j.wang@cgiar.org](mailto:j.wang@cgiar.org)

## NEPAL

GPO 8975 EPC 416, Kathmandu, Nepal  
Telephone : +977-1 535382 (Ext. 486)  
Mobile Tel : 9810 - 22573 ; Fax : +977-1 523996  
E Mail : [d.pant@cgiar.org](mailto:d.pant@cgiar.org)

## REGIONAL OFFICE FOR AFRICA

141, Cresswell Street, 0184 Silverton, Pretoria, South Africa  
Mailing Address: Private Bag X813, Silverton 0127, South Africa  
Telephone : +27-12 - 845 9100 ; Fax : +27-12 - 845 -9110  
E Mail : [iwmi-africa@cgiar.org](mailto:iwmi-africa@cgiar.org)

## KENYA

C/o. ICRAF, United Nations Avenue, P. O. Box 30677, Nairobi, Kenya  
Telephone : +254 - 2 - 524751,524000 ; Fax : + 254 -2 - 524001  
E Mail : [f.gichuki@cgiar.org](mailto:f.gichuki@cgiar.org)

## GHANA

IWMI Ghana, CSIR campus, Odeh Block,  
Airport Res. Area, Accra  
IWMI Ghana, PMB CT 112, Cantments, Accra, Ghana  
Telephone : +233-(0) 21-784752/53/54 ; Fax : +233-(0) 21-784752  
E mail : [iwmi-ghana@cgiar.org](mailto:iwmi-ghana@cgiar.org)

## REGIONAL OFFICE FOR INDIA

C/o. ICRISAT, Patancheru, AP 502 324, India  
Telephone : +91-40 -329-6161 ; Fax : +91-40 - 324-1239  
E mail : [iwmi-india@cgiar.org](mailto:iwmi-india@cgiar.org)

## REGIONAL OFFICE FOR PAKISTAN, CENTRAL ASIA AND MIDDLE EAST

12KM Multan Road, Chowk Thokar Niaz Baig,  
Lahore 53700, Pakistan  
Telephone : +92 - 42 - 5410050-53(4 lines) ; Fax : +92-42-5410054  
E mail : [iwmi-pak@cgiar.org](mailto:iwmi-pak@cgiar.org)

## UZBEKISTAN

Apartment NO.103, Home No.6, Murtazaeva Street,  
Tashkent 700000, Uzbekistan  
Telephone : +998 - 71-1370445 ; Fax : +998 -71-1370317  
E mail : [v.hornikova@cgiar.org](mailto:v.hornikova@cgiar.org)

## REGIONAL OFFICE FOR SOUTHEAST ASIA

(Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam)  
P. O. Box 1025, Kasetsart University Jatujak,  
Bangkok 10903, Thailand  
Telephone : +66 2 561- 4433 ; Fax : +66 2 561-1230  
E mail : [iwmi-sea@cgiar.org](mailto:iwmi-sea@cgiar.org)