

**COMMUNITY APPROACH OF GROUNDWATER
MANAGEMENT – EMPIRICAL EVIDENCE FROM SOME
STATES OF INDIA**

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Abstract:-

Groundwater has emerged as a critical issue for cities and towns in India. The most serious groundwater challenge facing the state is not in developing the resource but in its sustainable management. At present different issues related groundwater has been emerged and threatens for irrigation in agriculture sector. In broader context, groundwater governance deals with the Institutions (formal and informal), policies and acts. This thematic article is presenting the description of groundwater institutions in which community involvement and government policies will be mentioned. The main purpose of this paper is to find out that how farmer community have organized themselves for sustainable use of natural resource groundwater within such constraints in some states of India. To fulfill this objective, content analysis has been used in this article

Keywords:-Groundwater as a Common Pool Resource, Empirical Evidences from Some States of India, Policy Aspect of Groundwater

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Introduction

Groundwater irrigation has become instrument for pertaining food security and mitigating rural poverty in developing areas. But it also contributes to the condition of depletion in some agrarian states like punjab, Haryana, Gujarat, Andhra Pradesh and Uttar Pradesh (Sekhri, 2011). So, different strategies(Demand based approaches and supply based approaches) have been adopted for efficient management of natural resource groundwater in india. Groundwater management a complex interaction between human decisions and the physical enviorment which presents a serious policy design challenge and well known throughout the world. Groundwater aguifer typically common pool resource which is subtractible and easily exploited by human beings. These adverse effects could not be tackled since the management of groundwater suffers from fragmentation of responsibility at both Central and State levels, understaffing and out-dated databases. In order to manage this groundwater crisis community participation is very essential. The community management of groundwater is not a totally newconcept (Jenifer and Arul, 2012). However in literature a very few clear examples of successful groundwater management regimes can be found. But in this article, efforts have been made to synthesis some succееful examples from some states of india where community involved in the management of groundwater. This paper will describes some studied in which community have managed groundwater resource through formal and informal institutional structure for ecological and socio sustainbilty. The paper begins by defining groundwater as a common-pool resource and presents its characteristics in contrast to surface water. Second, the paper reviews some studies of groundwater management and link with farmer community for providing empirical evidences. This paper is based on secondary source (articles, books and internet sources) to find out the main objective that how community have organized themselves for sustainable use of natural resource groundwater within such constraints in some states of India. To fulfill this objective, content analysis has been used in this article.

Groundwater as a Common pool Resource

Groundwater is accessible to a large number of users; it can provide cheap, convenient, individual supplies; it is generally less capital intensive to develop, and does not depend upon mega-water projects. Groundwater development is also largely self-financing; its largely private develop-mint and use ensure automatic cost recovery. When it is not degraded by human

intervention, the major advantage of groundwater is its high microbiological quality; arising from its situation below ground and the natural protection this affords (Shah, Molden, Sakthivadivel and Seckler, 2001)

Groundwater as a common-pool resource because it has two type of characteristics subtractability and low excludability. Ostrom (1990) defined that subtractability involves the possibility of approaching the upper limit of resource units which can be produced. In the context of groundwater, this means that the water level drops with every unit extracted. Similarly Schlager (2007) also defined that Low excludability of groundwater means that it is difficult to exclude water users in particular, landowners from pumping water from aquifers. Aquifers are a source of relatively inexpensive, reliable irrigation that can be developed by individuals once either technology or energy is accessible. Feeny et al. (1990); Grafton (2000) have argued that these above mentioned two type of characteristics lead to the so-called tragedy of the commons, that is, the environmental degradation that occurs whenever a large number of individuals share a subtractable resource. However, it can be shown that it is actually the “tragedy of open access” that matters.

So here is need of proper approaches to manage this natural resource. In various type of approaches, direct groundwater management approaches and indirect groundwater management approaches are included. World Bank have described the definition of groundwater governance in a technical paper which is stated that

“Groundwater governance refers to those political, social, economic, and administrative systems that are explicitly aimed at developing and managing water resources and water services at different levels of society that rely solely or largely on groundwater resources”.

This definition includes all related mechanisms including financing, knowledge, and technical capacity, and the rights and responsibilities of sector players (including water users). But here this article is concerned only community approaches (farmer's role) in groundwater management in India's some states. Further this article will also describe the role of state government and Centre government for groundwater management particularly Groundwater Model Bill

Status of Groundwater in Some States

Community and Groundwater in some states of India

This community managed groundwater needs an understanding among the users about aquifer characteristics, the nature of the soil and the existing wells, in the neighboring area. There exist significant advantages of community managed groundwater. If the community users share a common understanding of the resource and the effects of their actions on the resource, they usually agree upon a set of rules to address their problems and they could determine the causes and effects of spacing wells together. The community people would start realizing that negotiation would be better than having controls imposed by the Central and the State Authorities(Jenifer and Arul, 2012).

Andhra Pradesh:-

Andhra Pradesh is one of several states underlain by hard-rock aquifers that have suffered considerable depletion of groundwater, largely for irrigation use, in recent decades. The Andhra Pradesh Farmer-Managed Groundwater Systems Project (APFAMGS) has adopted a novel approach to the problem. The core concept of APFAMGS is that sustainable management of groundwater is feasible only if users understand its occurrence, cycle, and limited availability.

In this project, The core organizational component is the groundwater management committee, a village-level community-based institution which comprises all groundwater users in a community.¹

Food and Agriculture organization (FAO) of the United Nations as part of an innovative model of development assistance, setup number of partnership projects, one of which involves supporting NGO networks for improving the livelihoods of small and marginal (mainly dry land) farmers in southern India. Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) an FAO supported project aims at improving the water use efficiency by empowering farmers in monitoring and managing groundwater resources in their hydrological unit. The project works for building people's institutions for groundwater management, augmentation of groundwater resource through artificial recharge and promotion of sustainable agricultural practices. The project is operationalised in southern parts of India spread over 638 villages in seven drought

¹ Thematic paper on “ Deep Wells and Prudence: Towards Pragmatic Action for Addressing Groundwater Overexploitation in India”, accessed from <http://www.indiawaterportal.org/articles/deep-wells-and-prudence-towards-pragmatic-action-addressing-groundwater-overexploitation> on dated 12.03.2014.

prone district of Andhra Pradesh viz; Anantapur, Chittoor, Cuddapah, Kurnool, Mahabubnagar, Nalgonda and Prakasam.²³

In Gujarat:

In this state, Out of the 223 blocks in the state, only 97 are safe while 69 are semi critical, 12 are critical and 31 over exploited. The per capita availability in north Gujarat and Saurashtra- Kutch is very low and putting tremendous pressure on ground water. The maximum fall of ground water level that has been observed in the monitoring wells of CGWB in the over exploited blocks is around 3m per year. At some places the piezometric surface of the deeper confined aquifer has gone down to 130 m.⁴

To curb this problem, here is emergence of two type of groundwater market(Informal/formal) is functioning. In formal groundwater market, the community of users have need a fair and beneficial concept of law regulation for proper water allocation among users. But in informal groundwater market, any farmer can sell his tubewell water to shah (1993) in his study explores the facts of groundwater market in this state where community decides water right as per their requirements. According to him this is “tit for tat” game theory in which if farmers do not pay their supplies will be cut and they have to use another water supply for irrigation purpose with fixed time and charges. Anjal Prakash(2005)Some tubwell in Gujarat depleted areas are registered, but some are not registered whoms owners are selling water to another farmers .

Within water markets, the various scholars in Gujarat and UP also study ‘Rental Water Market’. They have focused on the management of water buying and selling by the local farmer’s community within a fixed time-period of public tube wells. In India, public (government) tube wells were built with the intention of providing irrigation to all categories of farmers in a fair,

² About APFAMGS , accessed from <http://www.fao.org/nr/water/apfarms/about.htm> on dated 12.03.2014.

³ Report on Manging the invisible, Understanding and Improving Groundwater Governance, accessed from http://www.hydrology.nl/images/docs/ihp/groundwater_governance/Managing_the_Invisible.pdf on dated 14.12.2013.

⁴ Report (2007) of the Expert Group on “Groundwater Management and Ownership” Planning Commision, Yojana Bhawann, New Delhi.

equitable and affordable manner.⁵ Shah, Ballabh, Dobrial and Talati (1995) critically examined the performance of public tubewells which were managed by government initially and whose management was later transformed to local farmer's community for a limited period in Gujarat.

Bihar

Shah and Ballabh (1997) presents the key results and analysis of a field study of the role of pump irrigation markets in the agrarian transformation of six villages of the Muzaffarpur district in north Bihar. Pump irrigation markets have emerged as a dominant irrigation institution serving as virtually the sole powerhouse energizing north Bihar's new-found agrarian dynamism. Three criteria used to assess the performance of water markets were depth, breadth and efficiency. Their impacts were analyzed on four variables: cropping intensity, cropping patterns, labor use and crop yields. Water markets in the region have developed a high level of depth and breadth, but they are highly inefficient, generating large monopoly rents for pump owners. These produce powerful negative distributive impact; however, the output impact of monopoly pricing by water sellers is negligible because of the price inelasticity of irrigation demand explained by its high marginal productivity. The overall impact of water markets are highly beneficial; crop yield and cropping intensity achieved by water buyers are far superior to non-irrigators, and in many cases even in comparison to pump owners; cropping patterns used by water buyers are nearly the same as of pump owners; finally, operation of water markets substantially expands labor use in agriculture.

West Bengal

Role of community in groundwater management is emerged in those areas 1. Which are too much depleted because of groundwater development? 2. Which are not facing scarcity but forced to purchase water for irrigation because of high tariff over groundwater extraction? West Bengal adds up into the second type states; there is water market in informal form. In water abundant states like West Bengal, community role at the local level have emerged not due to groundwater scarcity but because of high tariffs over tube well extraction. Mukherji (2007) explored two types of informal groundwater institutions in West Bengal (a) first one being the kinship group-

⁵A. Mukherji and A. Kishore (2003). Tubewell Transfer in Gujarat: A Study of the GWRDC Approach. *Research Report 69*, International Water Management Institute (IWMI), Colombo, Sri Lanka.

owned electric submersible tubewell (ESB) in a Dunipara village in Birbhum district (b) the other is private water market with price regulation by the Panchayat Samiti (PS) in Mohanpur village of Hugli district.

Punjab

Punjab, a north-western state of India occupies only 1.5% of the total geographical area of the country but produces about two-thirds of the total food grains. Food surpluses from Punjab meet the food deficits of several states of India. Groundwater availability at shallow depth and well-developed surface water irrigation systems paved the way for the Green Revolution in the mid 1960s. As in other parts of the country, groundwater irrigation slowly became the most important source of irrigation and at present 72% of the total irrigated area in the state is dependent on groundwater(Selvi et.al. 2009) . Nowadays , this state is facing crucial stage of groundwater depletion because here are 85% blocks are overexploited. But still despite of this in some parts of Punjab informal institution ions of groundwater management are existing. From them Important study on informal water sharing institutions has been done by Tiwary (2010) in Bhajjal village, which is located in a Garhsankar block of Hoshiarpur district. This study described the principles, rules, sub-rules of shared tubewells which have been derived from the field observations, Interviews, focused group discussions. He further mentioned that the water right is connected with the right of land and when land sold the right of shared water is transferred to another farmer into the command area. The water rights are allocated among the shareholders according to the principle of “each according to its land”. The discussions revealed that the shared groundwater irrigation is not necessarily fixed forever. Partners sometimes break away from the shared system. One partner may leave the systems particularly for setting up his own tube well.

Autors Malik, Junaid, Tiwari and Kumar in IWMI report studied the shared groundwater irrigation system in the Bist Doab area of Punjab. They examined the important feature of this arrangement in the context of tradable water rights and its impacts at the productivity parameters

such as cropping pattern, land productivity (yield and net returns) and water productivity in crop production under shared irrigation systems and individual irrigation systems⁶.

In Maharashtra

Maharashtra is mainly an agricultural state with 82% of the rural population relying on agriculture. Out of the 318 blocks in the state, 287 are safe while 23 are semi critical, 1 is critical and 7 over exploited. The stage of ground water development is 48%.⁷ Here is also some stories of community based groundwater management. From them Foster, Limaye etc.al. (2009) have compared the Hydro geologic condition of groundwater and Socioeconomic Evaluation of Community-based Groundwater Resource Management in Hivre Bazaar. This is the drought-prone part of the elevated Deccan Traps country of Maharashtra State, is one such example and has received particular attention because of its apparent success at increasing farmer incomes and social well-being. It is the subject of this study to assess its socio-economic dynamics, agricultural evolution and hydro geological sustainability, which was carried out by GRASP in coordination with GW-MATE and with advice from GSDA-Maharashtra State.

Hivre Bazaar is very strong on community participation – its Gram Panchayat . The Village Council Leader (Sarpanch) has now held the position for 18 years – such continuity being an important issue for sustainability of community projects. Gram Sabha (village meetings) are held on a mandatory basis at least 5 times per year – with a male and female from each family expected to attend and contribute to any community project decided upon. The issues discussed at Gram Sabha can be of a holistic social nature with far reaching consequences.

The critical groundwater-related decision of the Gram Panchayat (on advice of the Sarpanch) was to prohibit the use of bore wells (and the drilling of vertical bores in the base of dug wells) for agricultural irrigation in 1993. This had the major benefit of moving farmers' minds and resources away from 'competition for deeper groundwater' to 'cooperation on maximizing benefits from groundwater to which they nearly all had access' (that is from 'supply-side measures' to 'demand-side management'). Other groundwater-related community management

⁶ Malik Kumar, A., (et. al.) (2007).Towards Evolving Groundwater Rights: the Case of Shared Well Irrigation in Punjab, *IWMI Report*, available at <http://publications.iwmi.org/PDF/H041885.pdf>.

⁷ Report (2007) of the Expert Group on “ Groundwater Management and Ownership” Planning Commission, Yojana Bhawann, New Delhi.

measures discussed and agreed by the Hivre Bazaar Gram Panchayat during the 1990s. A significant number of farmers have introduced sprinkler or drip irrigation technology. Although the State Government has initiated a drive to convert existing electricity connections for agriculture to metering, most electricity connections were of 'fixed tariff type' with an average tariff of I rps 2,400/a and I rps 7,000/a for a 3 HP and 5 HP connection respectively – equating to less than I rps 500 /crop/ha.

Haryana

In this state some institutional arrangement have done for groundwater community based governance at local level for future . So, Constitution of Climate Change Authority in State may be considered aiming, at coordination among various departments. The Authority will act as a facilitator to provide a framework for integration, planning, monitoring and assessment. While the overall programmed implementation will be facilitated, supervised and monitored by the, designated department. Village Committees and Eco-development Committees will have a greater role in implementation of works at field level with involvement of NGOs and other village level thematic groups like Self Help Groups under linkage *HARYANA STATE ACTION PLAN ON CLIMATE CHANGE* with Gram Panchayats. Line departments have identified the activities to be carried out by them with assistance from their strategic partner departments like State Remote Sensing Department, Science and Technology, Krishi Vigyan Kendra.⁸

Government Efforts for Inclusion of Farmer Community in Groundwater Management in India (Groundwater Model Bill)

The Ministry of Water Resources had drafted the 'Model Bill to Regulate and Control the Development of Groundwater' and circulated it to States in 1970. It was re-circulated in 1992, 1996 and 2005 to the States and Union Territories to enable them to enact suitable legislation on the lines of Model Bill. The bill proposes setting up of a Groundwater Authority in every State and Union Territory. The Authority will have powers to enter any government or private

⁸http://www.nicraicar.in/nicrarevised/images/State%20Action%20Plan/Draft%20Final%20Report_GIZ_INRM_State%20Action%20Plan%20on%20Climate%20Change%20Haryana_April25_2012.pdf

property and survey wells and groundwater resources. The purpose of such a bill is essentially to form a template for the states in their own regulations of rain water harvesting, notification of areas, requirements for applications for permits prior to digging and drilling of new wells, registration of existing wells and all existing water users. The bill suggests that quite far reaching power would be vested with the State governments, on behalf of the private landowners, and the State Ground Water Authorities are to be established for handling of management and development.⁹

States including Punjab, Sikkim, Arunachal Pradesh, Tripura and Nagaland have rejected the model bill for various reasons. These Six States including Punjab, have rejected a model bill by stating that it was too harsh on the people or that they required no such law. As per the requirement of this bill local farmers who are using groundwater, including wells, will have to seek its permission so that water resources are not exploited. According to the Central Groundwater Board, Punjab prepared 'The Punjab Ground Water (Control and Regulation) Act, 1998' on the basis of Model Bill and submitted it to the Punjab State Water Resource Committee. Sikkim and Arunachal Pradesh Governments said it was not necessary to enact a legislation as of now as there was very low groundwater development in the two States.¹⁰

State governments including Andhra Pradesh, Goa, Tamil Nadu, Lakshwadeep, Kerala, Pondicherry, Maharashtra, West Bengal have enacted the Groundwater Legislations, while other States are in the process of implementing them. Implementation of the legislation which is largely a technical interpretation of groundwater issues in a complicated socio-political environment has been more or less a non starter. The inherent conflict between techno-legal interpretation of the groundwater scarcity in relation to social, economic and institutional processes has emerged as a challenge to implementation of the bill.¹¹

⁹ Report (2007) of the Expert Group on "Groundwater Management and Ownership" Planning Commission, Yojana Bhawann, New Delhi.

¹⁰ <http://www.thehindu.com/news/national/six-states-reject-model-bill-on-groundwater/article103442.ece>,
<http://pib.nic.in/newsite/erelease.aspx?relid=93649>

¹¹ Report on "Andhra Pradesh Farmer Managed Groundwater Systems Project (APFAMGS Project), Food and Agriculture Organization (FAO) of The United Nations (UN), accessed from
http://www.fao.org/nr/water/apfarms/upload/PDF/DSGM_completion_rep.pdf, on dated 10.12.2013

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