

Ownership of Ground Water and Its Pricing: Rajasthan Perspective

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Abstract: In Indian law, the person who owns the land also owns the ground water below. Though this law has some relevance as far as the domestic groundwater use is concerned, it is outright absurd for industrial use. The result is that today industries withdraw ground water that remains unregulated and unpriced. This lawlessness on use and extraction of groundwater has created problem of over-exploitation of ground water in the state of Rajasthan. As a result almost entire state has been classified as dark zone from groundwater exploration point of view. The present paper highlights the status of ground water in terms of quality and quantity for the state of Rajasthan. The paper also highlights summary of various water laws followed at international and national level and proposes a pricing structure of groundwater extraction for domestic, agriculture and industrial use. Making law and keeping the file should not be mandate of the law-makers, but one should propose ways for stakeholders participation in effective enforcement of these laws. Paper also addresses these issues for effective implementation.

INTRODUCTION

The annual rainfall in the state of Rajasthan varies from less than 100 mm in extreme west of Jaisalmer to 1000 mm in eastern areas. Like many other northern and central states of India, Rajasthan receives almost 90 per cent of total rainfall during June to September of which July and August are the wettest months receiving about 66% of the annual rainfall. The state is mainly dependent on groundwater and is characterized by four agro-climates zones. These are as follows:

- (i) Arid (33.2 cm average rainfall, 61% area of state),
- (ii) Semi Arid (53.7 cm average rainfall, 16% area of state),
- (iii) Sub Humid (72.2 cm average rainfall, 15% area of state) and
- (iv) Humid (82.7 cm average rainfall, 8% area of state).

GROUND WATER STATUS

To have agricultural production from this rainfall in vast climatic variation, the state of Rajasthan has only 1.11% of country's surface water and 1.72% of country's ground water resources. Thirty percent

of the cultivated area is under irrigation, of which 74% is under ground water irrigation, in which 28.86% area is irrigated by tube wells and 45.58 % by wells. With this tremendous exploitation of ground water for irrigation and industrial use, the scenario of groundwater in term of its use in quantity and quality is at alarming and dangerous situation. Table 1 indicates status of groundwater quantity and its exploitation.

Table 1. Groundwater quantity and status of exploitation

Assessment Year	Annual G.W. recharge	Annual G.W. draft	Blocks			
			White (safe)	Gray (semi critical)	Dark (critical)	Over exploitation
1984	13790.00	4926.83	203	10	11	12
2004	10382.50	12991.20	32	14	50	150

GROUNDWATER QUALITY

The overall status of groundwater quality of the state is shown in the map (Fig. 1). The green colour indicates the groundwater quality having all the tested parameters within the limits of drinking water standard (BIS: 10500; F < 1.5 mg/l, NO₃ < 100 mg/l, TDS < 2000 mg/l). Red colour indicates the village having two or more parameters in excessive concentrations. Yellow colour shows village having only fluoride more than 1.5 mg/l, brown colour indicates village having only TDS more than 2000 mg/l, while blue colour indicates village having only nitrate more than 100 mg/l.

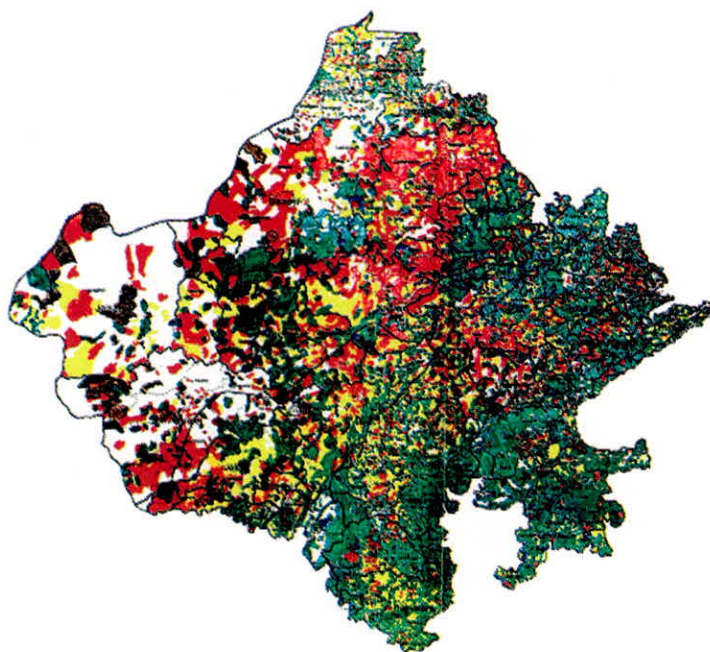


Fig. 1. Groundwater quality map of Rajasthan.

The district-wise categorization of fluoride affected area, salinity affected area, nitrate affected area is presented in Tables 2, 3 and 4. The status of the spread of problem is highlighted by Fig. 2.

Table 2. District-wise categorization of fluoride affected districts

<i>Sl. No.</i>	<i>Category</i>	<i>No. of districts</i>	<i>Name of districts</i>
1.	50% and above villages having excess fluoride	9	Tonk, Churu, Barmer, Pali, Sirohi, Jalore, Rajsamand, Ajmer, Nagaur
2.	25%-50% villages having excess fluoride	12	Jaipur, Dausa, Dholpur, Sikar, Jodhpur, Jaisalmer, Banswara, Dungarpur, Bhilwara, Bikaner, Hanumangarh, Sawai Madhopur
3.	10%-25% villages having excess fluoride	9	Bharatpur, Alwar, Jhunjhun, Udaipur, Chittorgarh, Kota, Jhalawar, Karauli, Sriganganagar
4.	Below 10% villages having excess fluoride	2	Baran, Bundi

Table 3. District-wise categorization of salinity affected districts

<i>Sl. No.</i>	<i>Category</i>	<i>No. of districts</i>	<i>Name of districts</i>
1.	50% and above villages having excess TDS	3	Churu, Barmer, Bharatpur
2.	25%-50% villages having excess TDS	18	Jaipur, Jalore, Karauli, Nagaur, Sriganganagar, Alwar, Bundi, Sirohi, Tonk, Pali, Ajmer, Jaipur, Dholpur, Sikar, Jodhpur, Bikaner, Hanumangarh, Sawai Madhopur
3.	10%-25% villages having excess TDS	7	Jaisalmer, Kota, Bhilwara, Dausa, Jhalawar, Rajsamand, Udaipur
4.	Below 10% villages having excess TDS	4	Banswara, Chittorgarh, Bundi, Dungarpur

Table 4. District-wise categorization of nitrate affected districts

<i>Sl. No.</i>	<i>Category</i>	<i>No. of districts</i>	<i>Name of districts</i>
1.	50% and above villages having excess nitrate	3	Churu, Nagaur and Jhunjhun
2.	25%-50% villages having excess nitrate	16	Jaipur, Barmer, Sikar, Tonk, Chittorgarh, Jodhpur, Dholpur, Alwar, Sawai Madhopur, Dungarpur, Rajsamand, Banswara, Bikaner, Udaipur, Karauli and Bhilwara
3.	10%-25% villages having excess nitrate	9	Dausa, Ajmer, Jhalawar, Pali, Sirohi, Bharatpur, Kota, Jalore and Jaisalmer
4.	Below 10% villages having excess nitrate	4	Sriganganagar, Hanumangarh, Baran and Bundi

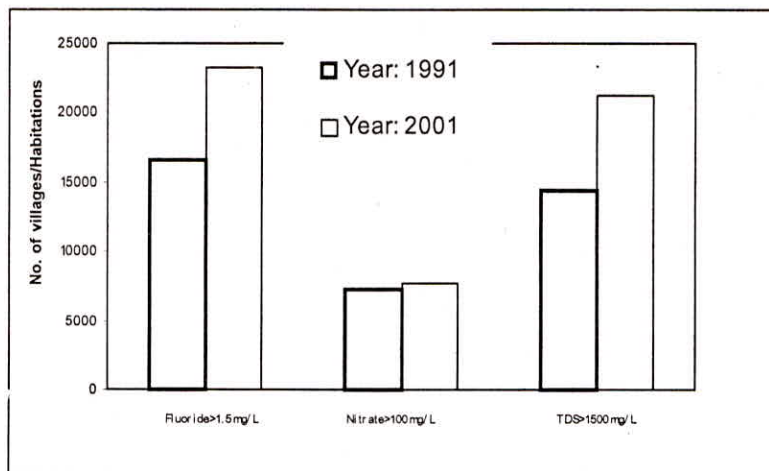


Fig. 2. Status of the water quality deterioration due to salinity and nitrate.

EXISTING STATUS OF WATER HARVESTING STRUCTURES AND AQUIFER RECHARGE STRUCTURES

To improve the water quantity and quality, water harvesting and aquifer recharge structures are made by irrigation and ground water department. Brief details of these structures are as follows:

Harvesting of Surface Water by Irrigation Department

The Water Resource (Irrigation) Department has prepared a Master Plan for construction of Water Harvesting and Ground Water Aquifer Recharge Structures during the year 2000-01. Under this Master Plan, various types of works such as Anicuts, Sub Surface Barriers, Guide bunds, Talab, Khadin, Tankas, Wells/Baories, Soak Pits are proposed in 30 districts of the state. The remaining two districts (Ganganagar and Hanumangarh) have been left out because of being Canal Command Area. The abstract of the Master Plan is given in Table 5.

Table 5. Proposed water harvesting and groundwater aquifer recharge structures

Sl. No.	Item	Phycal No. of proposed works	Estimated cost (Lacs in Rs.)
1.	Anicut	14320	81329.29
2.	Sub surface barrier	1179	3621.39
3.	Guide bands	825	6286.90
4.	Talab	7349	25446.36
5.	Khadin	916	3713.06
6.	Tanka	6426	4037.03
7.	Wells/Baory	5921	8178.53
8.	Soak pits	2059	1789.66
	Total	38995	134401.91
		or say	1344.02 crores

The works under this Master Plan are being taken up by the Irrigation Department according to the availability of funds. Until the end of February, 2006, a total of 2279 number of works have been sanctioned at a total estimated cost of 226.73 crores. Out of these sanctioned works, 1039 number of works have been completed up to February, 2006 and 1240 number of works are incomplete.

*Master Plan for Artificial Recharge to Ground Water
(prepared by Ground Water Department)*

The Ground Water Department in the year 2003-04, prepared a Master Plan for Artificial Recharge to Ground Water in the state. The surplus rainwater availability in a catchment, hydro-geological conditions of the area, and the present status of groundwater development etc., have been analyzed to identify 299 sites, where rainwater could be used to recharge groundwater regime through artificial recharge techniques.

In the Master Plan, to check the part of surface runoff, sub surface barrier, sub surface dykes along with vertical recharge shaft, etc., have been proposed. Other supporting structures, like trenches, pits, dugwell, shafts, inverted tubewell, etc., have been proposed to augment infiltration rates. These structures are expected to benefit surrounding areas, about 400 metres on upstream side and 700 metres on downstream side of the proposed site. This plan has been recommended to the State Irrigation Department for execution at the field level along with works included in their Master Plan.

Roof Top Rain Water Harvesting Structures

The Ground Water Department has commenced the works of construction of Roof Top Rain Water Harvesting Structures in the year 2000-01 with the financial assistance provided by the Ministry of Water Resources, Govt. of India through the Central Ground Water Board. Until now, a total number of 21 Roof Top Rain Water Harvesting Structures in 17 government buildings have been constructed by the State Ground Water Department. Looking at the importance of this activity, the state govt. in May, 2000 issued an order making it mandatory for constructing Roof Top Rain Water Harvesting Structures on all buildings in urban area on plot sizes measuring 300 sq. metres and above all the govt. and privately owned buildings. The Ground Water Department provides technical know-how in designing Roof Top Rain Water Harvesting Structures to various agencies and to the public.

INTERNATIONAL GROUND WATER LAWS

Private ownership of ground water is practiced in many countries including USA. However, there is a growing distinction made between the concepts of ownership and right to use. Ownership does not automatically convey the right to pollute or over-exploit ground water. In other countries such as Indonesia, Australia, and Peru, ground water is considered as a public good, either through legal tradition or through the suppression of private ownership rights and the transfer of the resource to the public domain. There are two primary pieces of national legislation mandate for the protection of ground water in United States:

- (i) The Clean Water Act (1972, 1987) which authorizes the US Environmental Protection Agency (EPA) to protect all water resources, and the Safe Drinking Water Act (1974, 1986), which sets minimum drinking water standards, establishes special protective statues for sole source aquifers;

- (ii) The EPA's well head protection program, under this programme each state is required to design and implement a plan to protect public groundwater supplies from contamination within a framework of criteria established by EPA.

In 1977 the ground water act of Thailand was enacted to bring groundwater activities within designated groundwater areas under government control. The Ministry of Industry is responsible for designating regions as groundwater areas, issuing directives and enforcement. The director general of the department of mineral resources is responsible for administering the Act including the processing of permits and registration of wells. The act is being implemented in areas where groundwater resources are particularly critical and are threatened by over-exploitation and pollution. Directives issued under the provision of the Act includes, specifications for drilling and well construction, methods of water extraction and conservation, technical measure for pollution control, drinking water standards and technical principles for subsurface disposal of liquids. Penalties for violations include fines, imprisonment and confiscation of equipment. A policy has been adopted of not granting permission to construct new wells in areas where there is an adequate public water supply. Strict controls on groundwater use are applied in critical zones.

NATIONAL GROUND WATER LAWS

A summary of legal rights to water sources in India is as follows:

- (i) Tanks and Lakes (Artificial): Individual right of owners customary use. No right if the tank is on public land. Powers of the government to regulate use of private tanks in some states. Rights vested with the panchayats or municipality if tanks are on public land.
- (ii) Tanks Lakes (Natural): Customary right of the people recognized by the courts and under Easement Act. Absolute right of ownership and use.
- (iii) Wells (Private): Absolute right of the land/owners. No rights for others. Unlimited right to draw water from tubewells on private land.
- (iv) Wells (Public): Customary right of groups, castes or communities; but right for all under the constitution and the civil liberties act. Power to regulate.
- (v) The Government of Tamil Nadu has introduced a bill to regulate and control the extraction, use or transport of groundwater and to conserve ground water in certain areas in the state of Tamil Nadu. The act envisages (a) registration of existing wells, (b) regulation of sinking of new wells, (c) issue of licenses to extract water from non-domestic use, and (d) issue of licenses for transportation through goods vehicles. The act came into force with effect from 15-2-1988. The term ground water mentioned in this Act means the water which exists below the surface of ground and the term "scheduled area" means the whole of the city of Madras and the villages specified in the schedule. Any offense punishable under this Act shall be a cognisable offense within the meaning of the code of criminal-procedure 1973 (Central Act 2 of 1974).

Central Ground Water Authority has been constituted under Section 3 (3) of the Environment (Protection) Act, 1986 to regulate and control development and management of ground water resources in the country. The Authority has been conferred with the following powers:

- (i) Exercise of powers under section 5 of the Environment (Protection) Act, 1986 for issuing directions and taking such measures in respect of all the matters referred to in sub-section(2) of section 3 of the said Act.

- (ii) To resort to penal provisions contained in sections 15 to 21 of the said Act.
- (iii) To regulate and control, management and development of ground water in the country and to issue necessary regulatory directions for the purpose.
- (iv) Exercise of powers under section 4 of the Environment (Protection) Act, 1986 for the appointment of officers.

The Central Ground Water Authority is regulating withdrawal of ground water by industries/projects in 673 Over-exploited and 425 Dark blocks. In the over-exploited areas identified by CGWB along with respective State Govt., micro level surveys are being carried out to confirm the groundwater scenario. Based on these studies, more areas are being identified for notification for registration of groundwater extraction structures. To enable the States to enact Ground Water Legislation, a Model Bill to Regulate and Control Development of Ground Water has been circulated by the Ministry of Water Resources to all the States/UTs. So far the states of Andhra Pradesh, Goa, Tamil Nadu, Kerala and Union Territories of Lakshadweep and Pondicherry have enacted and implemented groundwater legislation.

In India there is no separate law for private owners to restricting the exploitation of ground water by private owners. There is a need for at least four different types of legal research and management to be carried out to explore alternative for appropriate groundwater legislation. These are (a) Examination is needed of the existing and possible legal regimes where private rights to ground water can be constructed with common property or common access rights. (b) Research is required to understand situation in which water right as separated from land rights and the possible legal alternatives and consequences of this separation. (c) Understanding of legal regimes in which environmental and other multiple use values play significant roles is required so that appropriate elements for reflecting these values can be incorporated in any new legal structures created in India and (d) Research required related to legal regimes for different hydrological or ecological situations.

Ground water was not mentioned in any of the lists in the seventh schedule of the Constitution of India. This could be because the farmers in their infinite wisdom did not envisage such a water crisis as we are facing today. The fact remains that we are faced with this water crisis. Furthermore all the attempts at action made by the various legislators have only tried to address extraction. None of the bills or acts has sought to deal with the inequity and inequality inherent in the very conceptualization of ground water. Water should not have been handed out to the regulatory states at the time of the framing of our Constitution. The reason why these bills and acts have failed is because the focus of regulation was merely extraction, and the authority vested with this power was based on political or linguistic divisions of the state. The magnitude of emerging problem is indicated by the fact that the Central Ground Water Board of the Government of India has been engaged in drafting a National Ground Water Bill. There should be an alternative legislation.

GROUNDWATER PRICING

Ground water is considered to be free entity. No price is levied upon groundwater extraction except in the state of Tamil Nadu, where there is licensing fee for different type of water uses in the state. An effective groundwater management which is based on the setting of realistic priorities, policies and objectives is needed, which may include (a) Ground water planning should ideally take place within the broader context of integrated water resource planning, (b) Planning should be based on the natural boundaries of the resource. Aquifers rarely respect administrative or natural boundaries. In cases

where aquifers cross international boundaries treaties or other international conventions may be required, (c) Groundwater planning should reflect a co-coordinated effort between agencies involved in all aspects of ground water, (d) Full protection of groundwater resources is rarely practicable, priorities must be carefully targeted, (e) Public input and feedback from all sectors of the community is of critical importance in resource management.

REFERENCES

- Azariah, J. and Jacob, C.T. (2006). Need for Ground Water Laws and Water Abstraction Ethics for Industrial Use. In: Fujiki, N. and Macer, D.R.J. (Eds.), *Bioethics in Asia*, pp. 196-198.
<http://www2.unescobkk.org/eubios/asiae/biae196.htm> (accessed on 6 September 2006).
- Central Ground Water Authority (2006). Groundwater Regulation. Central Ground Water Authority. Ministry of Water Resources, Government of India http://cgwb.gov.in/GroundWater/gw_regulation.htm (accessed on 6 September 2006).