ECONOMIC IMPLICATIONS OF GROUNDWATER MARKETS IN INDIA

Amrita Sarkar*

Groundwater is regarded as a major source of irrigation in our agriculture sector. Its potential paved the way for the green revolution in our country and we owe our 1960's food security to this blue gold. Keeping in mind the necessity of its preservation and its economic use, the author would try to address one of the most key features of India that is trading of this blue gold. The trading happens between farmers in general for increasing the productivity; nonetheless, it is the initial benefit of access which allows this trade to flourish in a phenomenal way. In simpler terms, we call such trading the 'groundwater markets'. The trading shows a peculiar feature of socio-economic feature of our country especially of the farmers. The trading also forces us to look at our current laws. An economic analysis of this significant yet ignored domain of environment law is taken up where abundant literature review has been done; however, there is hardly any change in the scenario. The author in this paper has simplified the situation with a hypothetical scenario of how big or rich farmers who have access to this blue gold with the use of extraction machines are exploiting the small or the poor farmers. This not only leads to the exploitation of the groundwater but also increase the income gap between the classes. As a conclusion to this governance fallacy, the author has described three

* *Law Clerk & Research Assistant, Supreme Court of India, New Delhi (India).*

models which have their own merits and demerits and could be used to situations with their own specific circumstances.

1. IT'S MY WATER. IT'S YOUR WATER. NO. IT'S OUR WATER.

"Even society as whole, a nation, or all existing societies put together, are not owners of the earth. They are merely its occupants, its users; and like good caretakers, they must hand it down improved to subsequent generations."

(Marx, Capital)

Groundwater is a common property resource because of its rivalrous and non-excludable nature. One person's share in the resource subtracts another person's share but at the same time the other person cannot be excluded from getting access to it. 'Because of this open access nature and absence of property right, the private individuals find no incentive to maintain this resource.'[1] 'The data given by NASA and GRACE (Gravity Recovery and Climate Experiment) together showed that one of the areas where there is a serious depletion of groundwater table in the world is Northern India.'[2] In a market with absence of government intervention, a scarcity is addressed by the demand-supply forces which ultimately lead to efficient allocation. This principle applies to the genesis of the groundwater markets in India as well.

'A groundwater market is an informal localized institution where units of groundwater is exchanged in lieu of a certain consideration which can be cash, kind, labour services, etc.'[3] 'Various studies on groundwater have

[1] Garrett Hardin termed this as the tragedy of commons where the property which is either not owned by anyone or is held collectively, would ultimately lead to its destruction due to its over-use.

[2] NATIONAL GEOGRAPHIC NEWS (May 21, 2013), http://news.nationalgeographic.com/news/2010/02/100217-groundwater-crisis-nasa-satellites-india-environment.

[3] K. Palanisami, *Water markets as demand management option: potentials, prospects and problems* (May 28, 2014) http://www.iwmi.cgiar.org/Publications/Other/PDF/NRLP%20Proceeding-3%20Paper%20-%203.pdf.

shown that such markets have been in existence for a considerable amount of time.'[4] 'In fact, it is considered to be a successful contributor in the agricultural economy of the country.'[5] However, in reality, the groundwater market itself has a fallacious concept. In a market model where property right is clearly defined, the sellers sell those products that they own whereas the groundwater market facilitates the selling of the water without having demarcated property right over it.

India follows tied possession property right system in respect of groundwater which means if you have the land, you get the right to extract water below it. As per the Indian Constitution 'Water' is a state subject under Entry 17 of List-II subject to Entry 56 of List I. Though there is no specific mention of groundwater 98 under the illustration (g) of sec-7 of The Indian Easement Act, 1882, it is said that the landowner has the right to draw water underneath the sub-soil without any limit. The water below the land forms a part of the dominant heritage and is transferable along with the land. 'In short, it is considered as a chattel with the land.'[6] However, this theory has increasingly been discarded due to its unjustifiable and inequitable water claims. 'One of the biggest examples is the Groundwater Model Bill, 2005 which though did not get approved by the Parliament but has been adopted in almost all the states with various modifications.'[7] In 1996, the Supreme Court in *M C Mehta v. Union of India*[8] acknowledged that the groundwater table is depleting and a central board should be set up for the control,

[4] The literature on water markets in India dates back to as early as the 1960s.' studies conducted by K. Palanisami, Water markets as demand management option: potentials, prospects and problems, http://www.iwmi.cgiar.org/Publications/Other/PDF/NRLP%20Proceeding-3%20Paper%20-%203.pdf.

[5] While groundwater water markets are widespread in Gujarat, Punjab, Uttar Pradesh, Tamil Nadu, Andhra Pradesh and West Bengal, they are most developed in Gujarat, (June 5, 2012) http://www.ccsindia.org/ccsindia/policy/enviro/articles/gupta.pdf.

[6] WATER RIGHTS IN INDIA 8 – 31 (Chhatrapati Singh, ed., ILI 1992).

[7] The states which have enacted Groundwater (Control and Regulation) Act, based on the model bill are Andhra Pradesh, Goa, Tamil Nadu, Kerala, West Bengal, Himachal Pradesh, Bihar and Union Territories of Chandigarh, Dadra and Nagar Haveli and Lakshadweep.

[8] M C Mehta v. Union of India, www.ielrc.org/content/e9619.pdf (last visited Jun. 23, 2014).

management, preservation and protection of the resource. 'The CGWA board has been in existence for a considerable amount of time but it has not taken any action and nor is it fully effective yet.'[9] The website of CGWA shows a slogan, *"Ground Water is a Precious National Resource, Protect it, Preserve it and don't pollute it. Save Ground Water - Save Humanity."* 'But there is still no adequate mechanism which provides the groundwater extractor with enough incentive to adhere to this behavior.'[10]

In this paper, a situation would be analysed where the scarcity of groundwater is looming over an area and where the sellers of this common property are the big farmers who can afford to install Heavy Water Extracting Machines (WEMs) and engage in an economic exchange. Buyers are the poor farmers, who do not have access to any other source of water and access to any other source would incur them heavy transaction costs. An analysis has been done regarding what solution can be provided which would aim at stopping environmental degradation, to regulate groundwater market and to find a method to internalize the cost of externality.

2. Whose Profit and Whose Loss in Groundwater Market

In common property resources, there is difficulty in restricting the access for others. Thus, it leads to over-exploitation. But in India, the groundwater market has a very distinct feature. 'Here, the farmers who are having their own land along with enough capital to install WEMs are apparently the owners of this resource. And, by virtue of their initial investment capability, they become the sellers of this water market. 'The first possession law of property is followed in this market regime. 'The poor or the marginal farmers in order to carry on their crop production rely heavily on this water market.'[11] These markets help both the farmers in increasing their potential income

[9] R. IYER, WATER- PERSPECTIVES, ISSUES, CONCERNS 102 (Sage Publications 2003)
[10] *Id.*
[11] Hindustan Coca-Cola Beverages Pvt. Ltd v. Perumatti Gram Panchayat (Plachhimada Coke case) I.L.R. 2005(3) (Kerala) 192.

and also the society as a whole gets benefitted by the increment of social benefit attained on per unit production of food due to such sale. The large farmers sell the surplus water after covering their needs; hence, the value attached to the groundwater by the small farmers is much more than the sellers in the groundwater market. Also, it is a fact that the numbers of large farmers are much lesser in proportion than the small farmers. Therefore sellers end up becoming the price makers of the market. Due to this rent seeking behaviour, extractors would keep on increasing extraction as the market is providing them enough rent and their only initial cost of production is soon compensated by this rent.

3. Cost-Benefit Analysis of Groundwater Market

In India, the absence of clear property rights on groundwater has already begun the conflict of interests and the resulting dispute is proving to be costly for these individuals.[12] The large farmers, by virtue of open access, exploit all the available resource stocks. Finally the time would come when the driller would realize that it is no more economically viable to drill because the extraction rates would go beyond the sustainable yield rates. This may lead to drying up of the aquifers.

The cost that is imposed on government exchequer to remedy the groundwater scarcity and to cure the groundwater pollution by cleaning the aquifers is increasing continuously since there is no prohibition on the usage and the regulations show hardly any improvement. There is also a problem of rational individuals building up profit motives to sell the resource at an inappropriate price. The total social cost (private cost + externality) from the market is very high but it goes unaccountable to both the big farmers and the buyers. Since the market is profitable, there would be few people who in

[12] Anindita Sarkar, Symposium, '*Environmental Degradation and Sustainable Development: Groundwater Mining in Punjab, India: Issues of Intra and Inter-Generational Equity in Groundwater Irrigation*' (Apr. 10,11, 2010).

order to grab a share of rent, would invest on locating the water and it is quite possible that due to low or nil groundwater level, the individual might face a sunk cost. A situation may arise where his capital gets exhausted even before reaching the market. The capital invested gets lost in the midway because of the cost related externality. Also, higher sophisticated technology is required as the well is drilled deeper. This further drilling leads to environmental degradation. In economics, this environmental degradation cost incurred by the society is majorly because of technological externality. This per unit increase in cost of technology used in extraction is added to the per unit price of the water in such market. Thus, this externality leads to excessive cost overriding the benefit. As the price of the water keeps on increasing, the income between the seller and the buyer gets more skewed. It is often seen that in land-water-labour locked relationship, the small farmers mortgage their land to these large farmers to get water to continue farming. And because of their inability to pay the dues, they end up selling their lands at extremely low prices. This further accentuates the problem of poverty. Another area of problem is the emergence of thin markets where lesser number of sellers and buyers enter into bargaining. Due to scarcity, very few sellers would be able to bear the cost of extraction and very few buyers would be able to continue bargaining at the increasing cost. Monopoly or oligarchy through anti-trust method would result in further unequal income distribution and concentration of wealth.

The government in order to ensure crop production in the state has introduced various schemes of subsidy on electricity rates, welfare policy instruments like Jyotirgram Scheme in Gujarat, etc. which again entails infrastructure costs. After analyzing, it could be said that the reason is only the legislative eternality which further strengthens the technological externality, stock related externality and cost related externality.

To summarise, legislative externalities arise when there is no clear-cut legislation demarcating and protecting different types of property. In this case, ambiguous property right system is overriding the benefit. Farmers invest on the extraction of groundwater, thinking that they have absolute rights over it but since it is impossible to delineate the water from the land, therefore in turn it affects the rights of the community as a whole. Their right to get share in the groundwater gets infringed as there is no positive law to stop this infringement. Also, there is no law regarding how to compensate the other land holders who have the equal right to get a share of groundwater but are unable to get access to it. In this case they should at least be compensated. This is one of the shortcomings of not having a law in the first place.

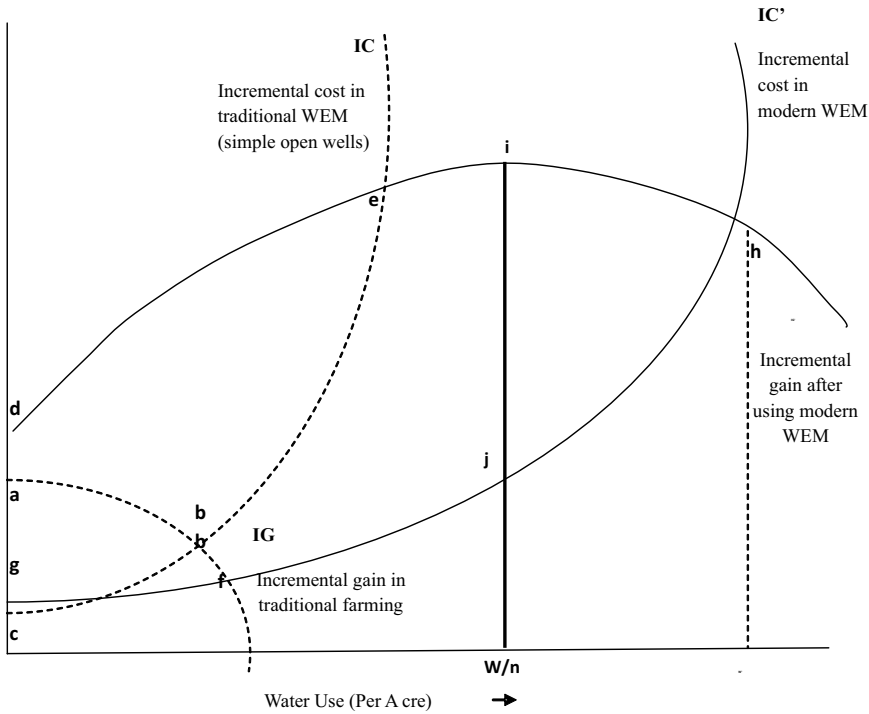
4. LEGISLATIVE EXTERNALITY- A GRAPHICAL EXPRESSION[13]

One of the basic features of the property right is that nobody can interfere with one's property without the owner's consent. The following graph represents the current scenario of property rights division where the property right over the groundwater of small farmers is infringed and the property is enjoyed by the big farmers. In addition to that, there is no proper legal regime to make the big owners compensate the share of the groundwater of the small farmer which he has used. In the following graph, the assumption is that both the small and big farmers are having equal land-holdings and have equal access to groundwater which is W/n (where W is the total groundwater available to the community and n is the total population). But the access is different i.e., there are small farmers who are having simple open wells and there are big farmers who are having modern WEM. In the figure, the area *abc*, enclosed by Incremental Gain (IG) and Water Extraction Cost (IC) curves represent the modest gains under the groundwater use by

[13] The term has been used by Tushar Shah, Sonal Bhatt, R.K. Shah, Jayesh Talati *in Groundwater governance through electricity supply management: Assessing an innovative intervention in Gujarat, Western India,* http://nrlp.iwmi.org/PDocs/pubs/GG%20through%20Electricity%20Supply.pdf (last visited Jun. 23, 2014).

the small farmers. Concurrent opening of both powerful Modern WEM by big farmer (IG') and the profit motive of the groundwater market has increased the gain from groundwater extraction dramatically from *abc* to *ghd*. But in this process of gain augmentation, the owners of powerful WEM (big farmers) expand their groundwater extraction from W/n to W'. Attracted by these profits, the owners of WEM (big farmers) extract more groundwater and with time experience steep rise in pumping cost (IC') as the water table begin to get lowered.

If effective checks are enforced to restrict total withdrawals till W, then each member will be obliged to use only W/n amount of water and forgo *hij* amount of profit. Alternatively if some members (small farmers) are not being able to use their share of resource, they can extract a compensation of up to *hij* from the 'water-lords' by threatening to claim their share. However this could happen only if equal rights over groundwater resources are effectively enforced for all members of the community. Since this does not happen in reality, resource endowed owners (big farmers) are able to appropriate an extra profit of *hij* which they actually get by using the share of others (small farmers who own the neighbouring land holding sharing common aquifer) groundwater. Thus the rich and influential owners (big farmers) of powerful WEM usurp others share of groundwater without compensating, but rather increasing the income gap between them.



5. VICIOUS CIRCLE[14] OF GROUNDWATER ECONOMY

Even after setting up Central Groundwater Boards and a set of various rules and regulations, the problem still persists. Since agriculture is the main occupation of such states, the state governments cannot risk it to just stop or prohibit the supply of the groundwater. The state government in turn devised various methods of licensing, electricity, taxes and obtaining NOC from the pollution board before installing new wells. These steps are aimed towards the judicious usage of the groundwater thereby regulating the supply which in turn increases the price of the water in the market. Most of the farmers engaged in the crop production are small and marginal farmers with low income; therefore at the end they are left with only two choices: either to leave farming or to continue buying water at higher prices. Even the

[14] *Water Brief Policy- IWRM Challenges in Developing Countries: Lessons from India and elsewhere*, Issue No. 24, (Jun. 24 2012), http://www.iwmi.cgiar.org/Publications/Water_Policy_Briefs/PDF/WPB24.pdf.

society loses out as it affects the agricultural production.

To sum up, there is a vicious circle going on in this groundwater economy. The poor farmers depend on the water sold in the market as they cannot afford the heavy cost of installation of WEMs. Due to this initial income inequality (and continuous) the big farmers emerge as water lords (as they have the capital to install machines) with the power of price discrimination and monopoly or oligarchy. Secondly, to stop the over extraction of the groundwater, the government brings out several schemes to restrict the use but it has serious consequences on the groundwater market as well as the production of crops which trickles down to affect the poor farmers' income. If the state government decides to give them subsidies of low electricity rate packages in order to maintain same crop production level, it would benefit the big farmers and thus, lead to over-extraction of groundwater. So, keeping this as the model problem what could be the solution?

VII. SOLUTIONS

Eminent Domain

All natural resources are allotted under the state list subject to Union list. It is possible that the state can acquire the property over the groundwater by blocking the open access. They themselves can provide water in various centres keeping in mind the sustainability and the farmers' welfare. This would mean complete prohibition of usage of groundwater by the private parties. In other words, it supports the application of Public trust Doctrine (first mentioned in *M.C. Mehta* v. *Kamal Nath*) which imposes a legal duty upon the State to protect natural resources. It disallows, any private person to acquire a "vested right to appropriate" these resources in a manner that it is "harmful to the interests protected by the public trust." Thus the State, as a trustee of these resources, cannot turn them for private benefit.

However, this control has several negative effects. Emergence of black markets is one of them. Moreover, constant vigilance and scientific information regarding the optimum extraction is needed otherwise this method would seem futile. If a constant price policy is adopted by the government then it would lead to a constant extraction rate till the resource gets exhausted. Also, if the government price does not rise over a period of time then wastage would increase and individuals would not make a sustainable use of it. If the power is centralized then it would take longer time to react to the changing needs and values of the groundwater in a particular place with a given set of conditions. Here in this case, the goal of the government is to achieve equitable distribution and sustainability. But in this process the economic efficiency gets lost. What the government can do is to create schemes where the amount of water would be distributed according to the farmers' land holding and its annual income capability. This would ensure the continuous flow of agricultural production in that village/area and would keep a record as to how much is the usage required and how much control is needed.

Privatization with Government Intervention

The second option is to give the property right to some private party. Suppose, the right over the groundwater to a particular limit is auctioned out by the government to a private individual and he is also allowed to sell the water to the other farmers. In this case, the step would ensure that the owner has an incentive to conserve it for the future so that he can generate the maximum benefit out of the stock. Also, he can allocate the resource to the highest value being offered in the market which ensures economic efficiency. But, here also the problem lies with equitable distribution. Since income of the buyers is not same as others, many buyers would not be able to get access to the resource. In such cases, the government can intervene as right to property cannot override the public interest. The owner would be

compensated for the subsidy being provided. In this model, the government can make it stricter by setting up a dispute redressal board where the complaints against the persons would be taken and adjudicated upon and if necessary, various penal provisions given in Environment Protection Act, 1986 can be used.[15]Mexico faced the similar problem and then they brought penal charges against the non-compliers. And the problem though still persists but in a lower scale. Currently, there is no conviction rate as nobody knows who the owner is and who should be responsible for the damage caused. Also, future research on this particular model may yield some valuable result.

Cooperative Governance

Under this third model, the Panchayat could be given the right to control the resource by the government. There can be a democratic selection of group leaders assisted by state authority who would take charge of this undertaking. The people in the village would have the incentive to work for the sustainable purpose as well as equitable distribution with the help of assistance from the government officials. The best part is that conservation works could be done easily as the benefit is theirs and they would take direct interest in it without waiting for the state to do it. Common property regime can control the open access to the resource by making it a conditional access. The rights over the property would be jointly exercised by the community where there would a representative from each household and all decisions would be democratically made. The government may impose any administrative rules like reservation according to income capacity, female seats, etc. for ensuring better participation in the decisions made. There is an act on cooperative governance of irrigation water i.e., Orissa Pani Panchayat Act, 2002[16] which is one of the current models of cooperative governance

[15] *See* http://www.dowrorissa.gov.in/PaniPanchayat/paniact.htm (last visited Jun. 18, 2013).
[16] PANI PANCHAYAT, http://panipanchayat.org/ (last visited Jun. 18, 2013).

being supervised by the government authorities. The idea is simple in cooperative system: the incentives would drive the farmers to work towards the sustainability and the problems of access could also be solved as it would be democratic. Since most of the farmers are marginal or small, therefore, their interest would be kept in mind while taking any decision.[17]One of the initiatives that were started in this regard was started by Late Mr. Vilasrao Salunke in 1974 after the government's failure to tackle the drought situation. The cooperative body has community based water schemes, decoupling water rights from the water rights from land rights. The village doesn't allow individual wells; 20% contribution of each member, each from the community and the most remarkable step that they have taken is that they don't allow irrigation rights to be sold along with the land. It is a success in Maharashtra; they have also banned water intensive crops. Moreover, each member from the household take the decisions mutually irrespective of the fact that whether one has a well or not as everybody is conscious of the effects on the sustainable development. 'Currently there are few villages which follow a model known as Water User Association, which could be called as the replica of this model."[18] 'WUAs have a lot of potential to override this legal vacuum which fails to address this depleted common property rights impediment.'[19]

But, in reality the cost of shifting the ownership from private to cooperative would be huge as the large farmers might engage in multiple litigations, creating high transaction cost in the process. Also, the Indian villages are divided into caste and class[20] therefore practically how far it would be

[17] Videh Upadhyay, *A Rights Based Approach to Water User Associations in India*, (Jun. 29, 2014), http://www.ielrc.org/activities/workshop_0612/content/d0620.pdf.
[18] *Id.*
[19] PRAKASH, THE DARK ZONE- GROUNDWATER IRRIGATION, POLITICS AND SOCIAL POWER IN NORTH GUJARAT 209 (Orient Longman 2005).
[20] The World Bank, *Deep Wells and Prudence: Towards Pragmatic Action for Addressing Groundwater Overexploitation in India*, (2010), http://siteresources.worldbank.org /INDIAEXTN/Resources/295583-1268190137195/DeepWellsGroundWaterMarch2010.pdf.

possible to make this cooperative a democratic body is still a matter of concern. An example has been given regarding Sangpura village in Gujarat where 40% of the households do not have access to the water and access is tilted towards the big farmers who are the Patels, the higher caste. Here it is difficult to bring a concept of cooperative governance.

Timely action to save this blue gold.

"In this world which is so respectful of economic necessities, no one really knows the real cost of anything which is produced. In fact the major part of the real cost is never calculated; and the rest is kept secret."

Debord, The Society of the Spectacle

Groundwater market by providing water to these farmers has contributed largely to the agricultural production. Simultaneously, confronted with high social cost, market monopoly and rent seeking behavior of the individuals, the need of the hour is to suggest the government to find the best solution. A World Bank report[21] has described India to be the largest user of groundwater in the globe, claiming that India is a user of estimated 230 cubic km of groundwater every year which is more than a quarter of the global total. This is because of its high elastic demand. It is predicted that by 2025, an estimated 60% of India's groundwater aquifers would be in critical condition."[22] 'On the other hand, the government's licenses, permits, electricity taxes, various other regulation and Groundwater Boards are not giving enough incentives to the individuals to conserve the property as their own property and make the best use of it.'[23] The farmers are unaware of the opportunity cost of the lost groundwater as they keep on extracting the

[21] *Id.*

[22] Annie Zaidi, *Punjab, deeper and deeper tube wells are sunk as the water table keeps going down*, THE HINDU, http://www.hinduonnet.com/fline/fl2414/stories/20070727001709300.htm.

[23] Annie Zaidi, Punjab, deeper and deeper tube wells are sunk as the water table keeps going down, THE HINDU, http://www.hinduonnet.com/fline/fl2414/stories/20070727001709300.htm.

water. Addition of one seller in the market burdens the existing sellers with a cost that they do not realize while they are entering the market. This leads to over-crowding and congestion. Ultimately, there is no resource left to be exploited.

Currently, out of the three possible solutions, the government can try any of the three solutions depending upon the place and other conditions prevailing. Sec-7(g) of The Indian Easement Act, 1882 should be amended so that there is no ground of right to property claims on the part of groundwater extractors. Timely action has to be taken to manage this endangered resource on the principle of inter and intra-generational equity, the precautionary principle, conservation of natural resources and environmental protection.