The Role of Religiosity in Analyzing Households' Willingness to Pay for Water

Muhammad Attique Farrukh, Syed Nisar Hussain Hamdani* and Dr. Mirajul Haq

Abstract

This paper analyzes how religious beliefs affect willingness to pay (WTP) for water, apart from the conventional factors identified in the literature. The motivations behind this exploration are multiple. Firstly, the recently presented Divine Capital Model (Hamdani, 2012)[14] claimed that the Divinely attributes such as spirituality, religiosity, ethics and reinforcing infrastructures significantly affect the human decisions for time and resource allocation. Secondly, a preliminary evidence (Attique, 2013) shows that religious beliefs and attitudes[15] have a stronger influence on households' WTP for water. Using the Divine Capital Model, the present study modeled the WTP for water to see the effect of economic and non-economic factors.

The study is based on data from 245 households in District Rawalakot in the state of Azad Jammu and Kashmir Pakistan, where availability of water and access to improved and better water system is an issue. The empirical analysis is carried out using the Ordinary Least Square (OLS) method of estimation. The findings indicate that religious variables, i.e. prayers, belief, practices have a significant effect on the sample households' WTP for water. The results of the study also reveal that households with a higher expenditure are willing to pay more for an improved and better water system. This finding is consistent with the environmental economic theory which stipulates that demand for improved environmental quality increases with income. Education level of head of household is positively influencing WTP for water, which stems from the fact that educated people are more willing to pay for improvements in water quality because they can value it. These findings have many implications; there is a

[14]The Divine Capital is defined as the level and combination of religiosity spirituality, ethics and infrastructures which re-enforces all these attributes. When all these are combined, it produces a systematically different wisdom for resource allocation (Hamdani, 2012).

[15]Islam lays great emphasis on spiritual and physical purity. Water is the most important ingredient for attaining cleanliness of body with Muslims using it for performing the ablution prior to the five obligatory prayers performed daily. According to the Bible, water is connected with the baptismal cleansing for the forgiveness of sins as in Hebrews 10:22. Also in Judaism rituals, washing is intended to restore or maintain a state of ritual purity and its origins can be found in the Torah. These ablutions can be washing the hands, the hands and the feet, or total immersion which must done in 'living water' http://www.africanwater.org/religion.htm).

*Muhammad Attique Farrukh <sardaratiqfarrukh@yahoo.com>, Syed Nisar Hussain Hamdani <nisarhamdani@gmail.com> and Mirajul Haq<haqmirajeco@yahoo.com> and are respectively M.Phil Scholar, Professor and Director and Assistant Professor at Kashmir Institute of Economics, University of Azad Jammu & Kashmir Muzaffarabad.

scope to improve water services in view of the Divinely attributes of people, government can enhance people's participation in water improvement schemes through Religious motivation of people.

Keywords: Resource allocation, Divine Capital, willingness to pay, people's participation
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1. Introduction

Water is a necessity of life. It is used in every household for drinking, cooking, washing and bathing purposes. Water issue has occupied a huge space in recent past economic literature as "water is our most precious resource and sustains all life on earth" (Morris J. Wosk Centre for Dialogue 2002). It is obvious that access to better and an improved water supply is not only a basic need and prerequisite for a healthy life, it is also a basic human right. Water is considered as a key to prosperity and wealth being one of the most important natural resources (Arbues, *et al.* 2003). Access to and use of safe drinking water can make an immense contribution to health, productivity, and social development (Luc Armand Totouom Fotue 2012). There is positive correlation between increased national income and the proportion of population with access to improved water supply, as safe drinking water is an essential component of primary health care and plays a vital role in poverty alleviation (Haq, *et.al* 2008). According to World Health Organization (2002) approximately 3.1 percent of deaths in world are caused due to unsafe and hazardous water, sanitation and hygiene. A World Bank report shows that about 80 percent diseases in Azad Kashmir are born from unsafe water (LG&RDD 1979). People lacking access to safe water are vulnerable to water-borne diseases and illnesses that are a major health concern globally.

These issues clearly highlight the significance of water in the individual's life and its economic standing. Where economic behavior of an individual is affected by secular factors, religiosity too does have an imposing impact on his economic choices and behavior as postulated by Hamdani (2008).

Studies are now available which found that there exists a correlation between religiosity and the use of natural resources (Hamdani 2008). Economics is now studied in relation to various aspects and one such notable aspect is

religion. The study of economics in religious context is at its boom now and the verity of this proposition can be best judged by the fact that an emerging framework 'Divine Economics' [developed by (Hamdani, 2000)] is solely devoted to the study of religion and economics in each other's perspective using the scientific processes.

According to this model, an individual's economic choices are not only governed by worldly life but also by a belief in the life hereafter and religious utility. The consideration of economics in connection to religiosity guides one to realize that there might exist a systematic relationship between religiosity and use of natural resources especially water. Despite the unchallengeable significance of water in relation to Divine attributes, no prominent work has yet appeared that explores the willingness to pay for water using Divine Capital Model.

The current research, undertaken using the WTP, focuses on examining the important socio-economic factors and the effect of religious factors on demand for water, as the use of water for attaining ritual purity has been emphasized by all the Semitic religions. The study is based on data of two hundred and forty five households from district Rawalakot Azad Jammu and Kashmir where the existing water supply system is unable to meet the requirements of dwellers of area[3] resulting in scarcity, non availability and degraded quality of water. To measure households' WTP for water, the indicators used are belief, practices, prayers, and other control variables including households' income, household heads' education level.

The main objectives of the present study are; a) To measure HH's WTP for water, b) To analyze the effect of religious factors on WTP for water, and c) To suggest policy recommendation. The paper tests the hypothesis that Religious variables do not affect willingness to pay for water against the alternate that they do. The rest of the study is organized as follows: Section 2 presents a review of previous studies on the WTP for water. Section 3 focuses on the methodology consisting of theoretical framework, empirical model and data description. Section 4 emphasizes on the results obtained from the empirical analysis. Section 5 consists of conclusions and policy recommendations.

2. People's Willingness to Pay for Water: A Literature Review

This chapter of the study presents review of the relevant literature in mainstream Economics and literature reviewed within the recently emerging "Divine Economics" framework. Researchers have been consistently pouring their endeavors in the exploration of Conventional Economics Framework. A lot of literature is dedicated to this framework. One significant work has been done by Casey *et al.* (2006). They conducted a survey using Contingent Valuation Method (CVM) to analyze peoples' WTP for getting access to safe water services at home. For this purpose information was collected from Manaus, a city of

Brazil regarding current water needs, health issues, and households' socio-economic characteristics. According to study findings residents of Manaus, Brazil were willing to pay more than R$12 (US$6.12) per month. The findings further revealed that households were willing to expend dearly for getting better water services. This is an indication towards the public's keenness and concern about better water quality. Whereas Chowdhury (1999) also used the CVM to estimate Dhaka slum-dwellers' WTP for safe drinking water. He found that CVM is the most effective tool for estimating WTP for a variety of public services. The results of the study indicate that dwellers of the area are willing to pay enough for water to cover the costs of providing it. These results suggest that higher water charges would be a financially viable way to generate funds for water system investments.

Haq *et al.* (2008) applied the CVM and Averting Behavior Method to examine the households' WTP for improved water services in Abbottabad district of Pakistan. The findings of study reveal that location of the households (urban or rural area), has statistically significant effect on WTP as people living in urban area are willing to pay more for better services. Source of water and education of the family members also has significant effect on households' WTP for improved water services. In averting behavior methods (boiling, filter, chemical) the income and water quality are found to be highly significant in all water purification strategies. They have also found that along with these factors, households' awareness has also an important impact on WTP and water purification. Sattar and Ahmad (2007) have done the similar exercise for Hyderabad district of Pakistan. The study used the averting behavior approach for curing water contamination. Their findings show that the formal education of household head and media exposure significantly affected households' WTP for the various water purification strategies. The study also indicates that income is comparatively less significant than education in explaining households' WTP for safe drinking water.

Moffat *et al.* (2011) investigated the WTP for an improved water quality and reliability in Chobe ward in Maun, the fifth largest town in Botswana. The findings of the study show that on average, 54 percent of the households are willing to pay for improved water quality as residents regard water as an economic good.

The review of literature shows that no prominent work has yet appeared that explores the willingness to pay for water using Divine Economics Framework. The present study is an attempt in the area of social sciences to assess demand for water through WTP approach in religious context. Religion is occupying a space in Economics gradually. It is strongly believed by some economists that economic rationality has great impact while choosing activities; as religious activities are based on economic rationality. On the other hand, conventional economics equates rationality with serving self interest through

maximization of wealth. It is also argued that a correlation exists between religiosity and the use of natural resources and people are likely to gain utility by choosing these activities like other commodities (Hamdani 2008).

Azzi and Ehrenberg (1975) and Iannacconne (1984, 1988, and 1990) have contributed considerably in this field. The work of Mack and Leigland (1982) and Barro (2003) also deserves mention as they highlighted the core areas while explaining correlation between religion and economics, leading to the emergence of the formal framework of 'Divine Economics' in early 2000 by Dr. Syed Nisar Hussain Hamdani, which is a framework to study economics and religion in each other's perspective using the scientific process. It comprises of theoretical model, empirical work, a series of papers and some survey instruments. In addition, the model propagates a number of propositions regarding economic behavior of an individual.

"Proposition No. 1: ***Change in perception about the planning horizon of an individual will alter his/her economic decision regarding present and future consumption, donations and bequests".*** (Hamdani and Eatzaz 2002).

Elaborating the above proposition, Hamdani and Eatzaz (2002) stated that belief and trust in an afterlife provides a totally different insight about consumers' planning horizon, i.e. consumers consider two lives, worldly life and life after death, in their life cycle.

Barro and McCleary (2003) came with the view point that individuals' behavior is influenced by religious beliefs that results in enhancement of economic performance while Hamdani *et al*. (2004) emphasizes that there is need to analyze the effect of religions and economics in each others' perspective through comparative study of religions. This is the way to approach a practical analysis of actual human behavior rather than a theoretical discussion and provides a better understanding about the preferences.

Studies are now available which found that there exists a correlation between religiosity and the use of natural resources. (Hamdani 2008). Such studies are based on assumption that people who believe in some religion are likely to gain utility by choosing these activities in religious manner like they choose economic activities. This aspect is consolidated by various religions in their teachings and scriptures. The Holy Qur'an and Bible present various references regarding the use of natural resources. The Holy Quran mentions the word "water" 63 times whereas in Bible water is mentioned 722 times. In the Bible books; Genesis and Revelation, water flows right through pages of scriptures[4]and a number of times the word water can be seen in Hadith books from two major sects of Islam i.e. Sunni[5] and Shia[6]. The most precious and valued source granted by Almighty Allah for human to survive and sustain in this

world is water without which human existence is impossible.[16] The Holy Quran affirms that the water is sole basis for the emergence of life on earth. The importance of water cannot be judged by this but the fact that Allah created every living thing from water: "We have made every living thing out of water" (Quran 21:30).

There are number of references from Divine and non Divine religions that highlight the importance of water for human beings and other living organisms. Water is basic necessity of life and its importance cannot be ignored and its importance makes it more demanding for individuals. But its demand is different among different people. To cap it all, if people are better served with improved water services at home, they are likely to be willing to pay more for water as it is obvious from above references that religion affects demand for water and consequently WTP for improved water supply system in communities.

3. Theoretical Framework

As the consumer demand theory is the study of human behavior, it is largely centered on the study and analysis of the utility of individual generated from the satisfaction of wants and needs. Those goods which generate more utility are more valuable to the consumer and hence consumer is willing to pay more against those goods. On the other hand, people believe in an afterlife since they perceive that there is a stream of utility based on the decisions and actions performed during current life for which they will be held accountable. Therefore, a rational agent will be one who follows a decision pattern which may ensure his utility maximization in both lives perspective. The rational individual would act considering the Islamic classification of categories because the rational agent's pattern is to maximize his/her utility in a different scenario. Hence, who believes in maximization of utility of two lives will demand more water for wodu, ghusal and self cleanliness by considering it obligatory as ordered by Allah. One, who believes in Farz/Wajib, will consider offering prayers or keeping him clean as an obligation considering basic Islamic classification of activities common to all sects as given in table 3.1 (Hamdani 2007).This will lead to a more demand for water, and hence the life pattern of that individual will be systematically different from a non-believer. The key objective of the study is to analyze the impact of religiosity (Divine Capital) on the HHs' WTP for water. Due to data availability constraints the focus of present study is the Muslim community among the believers. The utility approach based on Divine Economics framework is entirely different as it considers two lives i.e life here and life after here. Follow Hamdani

[4]http://www.learnthebible.org/water-in-the-bible.html

[5] References about water are teken here from four books namely Sahi Bukhari,Sahi Muslim, Sunan Abu Dawood and MalikMuwatta from Sunnite sources.

[6] Two books namely Usool Kafi and Tahdibul Ahkam are used here from Shiite sources for relevant references.

(2002), the utility function under Divine Economics Framework is given as follows;

$U = f(a^w, a^a)$

U= Satisfaction gained by individual from daily activities (market activities, sleeping /rest, enjoying, voluntary works, worship)

a^w = Activities performed daily considering life on earth.

a^a = Activities performed daily considering life after here.

An individual will derive his utility considering life here and life after here by focusing on different activities. Then his utility function can be written as;

$U_1 = f(C, D, L, V, H, R)$

C=Consumption, D=Donations, L=Leisure (Active and Passive Leisure), V= Voluntary works for welfare of others, H= Home activities like giving time to family members and other home related activities, R= Religious activities.

$U_2 = f(C^w, D^w, L^w, V^w, H^w, R^w)$

$U_3 = f(C^a, D^a, L^a, V^a, H^a, R^a)$

An afterlife hope plays an important role in decision making and the rational consumer maximizes his utility through considering after life as an important factor for making choices. Hence, to capture reliable estimates of HHs' WTP for water the following generalized model is used.

WTP = f(X, D) Where:

WTP = HHs' willingness to pay for water

X = Standard Economic Variables i.e. Income, Education etc.

D = Divine Capital i.e a combination of divinely attributes of individual such as Ethical Characteristics, Religious Characteristics, Spiritual Characteristics, Reinforcing Physical Capital. [7]

3.1 Empirical Model

To analyze rigorously the factors that explain HHs' WTP for water, the following baseline model is empirically tested.

$$WTP_i = \beta_0 + \beta_1 (H_i) + \beta_2 (L_i) + \beta_3 (R_i) + u_i \quad (1)$$

where WTP_i stands for HHs' willingness to pay for water, H_i is household's characteristics (Income, Education), L_i represents location of HHs (Urban, Rural) and R_i is religious variables (Prayer, Beliefs and Practices).

The empirical analysis is carried out using the Ordinary Least Square (OLS) method of estimation for WTP as a function of HHs' expenditures (proxy of income), HHH general education. The dependent variable WTP is willingness to pay in Rupees per month which is self reported by the HHs. The monthly average WTP for improved water system was found to be Rs. 315 per household per month. The minimum and maximum WTP for improved water system is Rs. 50 and Rs. 1000 respectively.

3.2 Data Description and Sampling Procedure

The data used in the study was collected from District Rawalakot Azad Jammu & Kashmir. The pre-tested questionnaires were run through systematic random sampling which is the type of probability sampling and known as more preferred method that allows proper applications of statistical inferences, and systematical statistical inferences and permits generalizing the sample findings to the entire population. We collected data from 245 HHs.

4. Results and Discussions

This chapter focuses on the analysis and interpretation of data obtained from the households in the study area through questionnaire under the Divine Economics Survey 2012 (Water Module). Two models have been regressed to see the impact of religious factors on WTP for water. The OLS Regression technique has been used to estimate the effects of explanatory variables on WTP for water.

4.1 Situation Analysis in District Rawalakot (AJK)

According to the 1998 Population Census, the district Rawalakot had a population of 0.411 million. Almost 100 percent of the population is Muslim while the rural: urban population ratio is 88:12 respectively.[8] Rawalakot has four tehsils: Rawalakot, Hajira, Abbaspur, and Thorar while each tehsil have twelve, eight, five and two union councils respectively.[17] Present study focused on tehsils Rawalakot and Hajira as Rawalakot is the capital city of the district and is centre of major economic activities. Whereas Hajira is second largest town and is also a centre of economic activities of the district. According to the report[9] the main water sources in Rawalakot are tap water, springs and boreholes (ground water). Rawalakot Nallah is the main source for the water supply system in the city.[18] There are 15,000 registered consumers and the current water demand of Rawalakot city is about 650,000 gallons/day, whereas the existing capacity of the water plant is approximately 400,000 gallons/day. In tehsil Hajira the current water demand is about 700000 gallons/day, whereas the existing capacity of the water plant is approximately 500,000 gallons/day. [Report of Executive Engineer, Public Health Engineering Rawalakot (2013)].

4.2 Regression Analysis

To investigate the impact of different determinants of WTP for water a number two models were empirically tested. The first model i.e. model I include all conventional variables to see the impact of conventional variables on households' WTP for water. Whereas models II includes the results of conventional as well as religious factors. Table 4.1 presents the results of these

[8] Sources:-Population Census Organization Islamabad.

[9] Report issued by Public Health Engineering and Environmental Protection Agency in December 2004.

regressions. The first model i.e. Model-I was used to analyze determinants of WTP for water. The parameters estimate in table 4.1 model-I show that income which is core determinant of WTP enter the model significantly and with expected positive sign. The result implies that households with higher income are willing to pay more for an improved and better water system. This finding is consistent with the environmental economic theory which stipulates that demand for improved environmental quality increases with income[10]. This result is also consistent with the findings of Gunalitake *et.al.,* (2007) who presented the good practices for estimating reliable WTP values in the water supply and sanitation sector[19] .Findings are also in line with studies of Adepoju and Titus (2009), Mehrara *et.al.,* (2009), Samdin *et.al.,* (2010), Wendimu and Bekele (2011) and Roy and Utham (2013).

The indicator "education" has a positive sign but is statistically not significant. This might be due to the fact that households strongly believed that provision of clean and safe water is the responsibility of government.

Table 4.1: Willingness to Pay for water in District Rawalakot Azad Kashmir

Dependent Variable: Willingness to Pay for water in Rs. Per month.		
Variable Name	**Model-I**	**Model-II**
Households' expenditures (Household expenditures used as proxy of income)	0.0033* (0.000)	0.0032* (0.000)
Households' head General Education (Years)	2.0595 (0.783)	2.5364 (0.703)
Location (Rural=1 , Urban=0)	8.8042 (0.791)	10.662 (0.718)
Availability of water at home	-32.8386 (0.344)	--
Severe Issue (1= Lack of water , 0=otherwise) (1= Lack of water , 0=otherwise)	98.757* (0.003)	84.962* (0.007)
Households' religiosity Index [Index of religious beliefs and practices (Daily prayers, Recitation of Holy Quran and Religious study/audio visual etc.]	--	4.9621* (0.000)
Constant	84.647 (0.366)	-310.76* (0.002)
R^2	0.27	0.42
Adjusted R^2	0.23	0.38
F Statistics	0.000	0.000
Df	12,232	13,231
Number of observations	245	245

Note: * Indicates significance at 5 percent level and ** Indicates significance at 10 percent level.

[10]Ashish Taru Roy and Uttam Deb. 2013. Households Willingness to Pay for Improved Waste Management in Silchar Municipal Area: A Case Study in Cachar District, Assam. Journal Of Humanities And Social Science. 6: 21-31.

These results fall close with observation of the survey teams and also to the study of Haq *et.al (*2008), Aepoju and Titus (2009), Samdin *et.al* (2010), Moffat *et.al* (2011), Wendimu and Bekele (2011) and Emilola *et.al* (2012).

Location of households was expected to positively influence the WTP for water. Contrary to a prior expectation, results reveal that WTP for water is not much influenced by location. One possible explanation is that the availability of water is a widely spread issue throughout the district Rawalakot irrespective of location. Therefore, location has not much to do with WTP for water.

Tap water availability, which is the one important indicator that explains households' WTP for improved water system. The results reveal that tap water availability has expected negative sign which is statistically significant. The negative sign implies that the households that lack tap water availability at home are more WTP for improved water system. Those who do not have tapwater available at home and rely on outside sources are willing to pay more than the tapwater users. The results match with the findings of the study of Nasima Tanveer Choudhry (1999), Wendimu and Bekele (2011) and Orgill (2012).

The variable "severe issue" was expected to have significant and positive impact on WTP for water. The results reveal that the households who feel that availability of water is a severe issue in locality are willing to pay more for improved water system.

As, already mentioned in section 3.2 that a rational agent will be one who follows a decision pattern which may ensure his utility maximization in both lives perspective. For example a rational Muslim individual would act considering the Islamic classification of goods and services because the rational agent's pattern is to maximize his/her utility in a particular scenario that forms typical preferences. Hence, who believes in maximization of utility of two lives reveal higher demand for goods and services which are religiously allowed or admissible and vise versa. One, who believes in obligatory activities (Farz/Wajib), will consider offering prayers or keeping him clean as an obligation. Hence a rational Muslim individual will consider non-availability of water 'a severe issue'. This implication is justified by the fact that non-availability of water in locality compels the rational Muslim individual to looking forward into a better and improved water system.

Finally, with the inclusion of one very important religious indicator i.e religiosity index (Daily prayers, Recitation of the Holy Quran, Religious study/audio-visual etc.) the Model-II is used to analyze the WTP for water. As, to measure religiosity one or two indicators are not enough to explain the factual position rather than there are number of qualitative and quantitative indicators and there is a need to look into qualitative and quantitative indicators which should be the representatives of all the sects of Muslims. Hence, one possible way to construct the indicators might be to use basic Islamic classification of activities common to all sects as given in table 3.1 (Hamdani 2007) . The results of Model-II showed that religiosity index is positively related to WTP for water and the

variable is highly significant. This implies that the more the households have religious orientation, the more willing they are to pay for water. Islam lays great emphasis on spiritual and physical purity. Water is the most important ingredient for attaining cleanliness of body with Muslims using it for performing the ablution prior to the five obligatory prayers performed daily. According to a Hadith (Sahih Muslim: Book 2, Number 0432), "cleanliness is half of faith". It reveals the central importance of cleanliness and purity and an essential role of water for purification through ablution. Ablution is an essential and obligatory part of prayers ritual; prayers performed in impure and tainted state are not considered as valid. Hence, it is binding on Muslims to carry out the ritual ablution before performing daily five prayers. As the Quran tells believers that Allah "loves those who cleanse themselves (9:108)"and instructs them: "O you who believe, when you rise to pray, wash your faces and your hands as far as the elbow, wipe your heads, and your feet to the ankle. If you are polluted, cleanse yourselves… Allah does not wish to burden you, but desires to purify you (5:6)". "Allah will reward those who purify themselves" as in the following Hadith: "The believers will come on Resurrection Day with brightness on their foreheads, wrists and ankles from the effect of ablution." Another type of ablution is bath [*Ghusl*]. It is also a source of purification from major impurities. And clean water is required to perform wudu as well as ghusl. Hence a more religious person will be more conscious about performance of obligatory activities. In religious perspective he will also demand more water to keep him clean as he knows; the Quran tells believers that Allah "loves those who cleanse themselves (9:108)". Hence the connection between water and religiosity is very much clear. The results suggest that apart from other conventional factors, religiosity also plays an important role in households' WTP for water.

5. Conclusions and Policy Implications

5.1 Conclusions

The key objective of this research was to assess that how religious factors i.e., belief, practices and prayers affect WTP for water. The present work is a small humble contribution towards extension of Divine Economics. Based on the fresh data collected through Divine Economics Survey, 2013 (Water Module), the key conclusions of the present study are presented below:

1. The one noteworthy finding is that religious factors have significant impact on households' WTP for water. The inclusion of religiosity index renders the results even more interesting. The study disclosed that households that are more regular in religious offerings and rituals are more willing to pay for improved water system.
2. On conventional side, the factors i.e income enters into the models with positive sign having significant impact on Households' WTP for water

whereas education is positively related to Households' WTP for water but not statistically significant. To conclude it, the higher the value of Divine Capital of households, the more willingness to pay for improved water system.

5.2 Policy Implications

The findings of this study have multiple-nested and enlightening implications; this research work gives an insight into future policy formulation at government, private and social level.

- The results of the study imply that households with higher income are more willing to pay for an improved and better water system. This means otherwise as; households with lower income are less willing to pay for an improved and better water system. This correlation leads us to suggest that improved and better water services should be declared a cost-free commodity. Hence, improved and better water services should be mainly sponsored by government or NGOs working in this field. However, a small amount of water tax on high income groups may be levied to partially support the government interventions.
- Education leads to an increased WTP for water among households. Since education is a key to development and awareness, WTP for water can be enhanced by mandatorily incorporating the chapter of "Better and Improved Water Services" in the academic syllabi of formal education as well as informal education.
- The central underlying theme and goal of the study was empirically testing of Divine Capital Model (2012). This purpose was achieved through the inclusion of religious variables i.e. religious index (belief, practices, prayers). Results reveal that households more inclined towards religion are more willing to pay for water.

To cap it all, there is a spacious scope to harness divinely attributes of people in order to improve water services. Therefore, researchers and stakeholders need to come a step ahead of conventional economics framework in order to explore into and solve real world problems, out of which, water problems are likely to occupy the widest space in the future local, regional and global policies.

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