

WATER IN ANCIENT INDIA

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From time immemorial water has been the driving force of every civilization and people attached great importance to an adequate supply of water for different purposes like agricultural operations, cooking, drinking, washing etc. People were aware of the medicinal and therapeutic value of water. Depending on the chemical and physical properties and also on a few other factors, our ancients had classified water into several groups. They had also made a thorough study of varying effects of conserving water belonging to different conditions.

Some Sanskrit texts give very interesting information on different types of water recognized by our people, chemical and physical properties thereof, their effects on the functions of the body and mind of human beings, impurities in water, necessity of purifying water and different methods of purification, types of water most beneficial during different seasons etc.

An attempt has been made here to bring out all the above details based on ancient and medieval Sanskrit texts along with details related to methods of exploration of underground water, their preservation and storage of surface water etc. In the present day background, it will be interesting and also helpful to know how people of ancient India maintained the quality of water in ancient India, methods of purification and storage of water etc. A study of these texts reveals that our ancients were also efficient in carrying out water - analysis and treatment of water scientifically in a simple manner. They were also aware of maintaining ecological balance for the welfare of mankind.

Key Words : Dakārgala, Gāngam, Haṁsodakam, Sāmudram.

Water is one of the substances without which life cannot exist. From time immemorial water has been the driving force of every civilization and people attached great importance to an adequate supply of clean water for different purposes like agricultural operations, cooking, drinking, washing, medicinal purposes, treatment of wounds, etc. The Mohenjodaro and Harappan ruins dating back 5000 years have thrown light on the fact that people of even that early period had given importance to proper water-supply for domestic purposes, irrigation and public baths. In ancient India water was used in all religious rituals and ceremonies because it was believed that the pure, divine, well-provided waters convey the offerings to gods. Water, though itself a purifying agent, was held to be very sacred and people were often exhorted not to harm waters

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which are full of saps and good food. It is needless to point out that water plays an essential role in the life of man, in his physical and mental development. It is an essential element causing health, prosperity and happiness.

The Vedic seers, in several hymns, invoked water, the purifying agent to be gracious with mankind, to purify men like mothers and to remove all physical defilements. They believed that waters consumed by men give strength and become auspicious drink within the stomach. Hence they prayed, "May the waters be pleasant to our taste, be free from diseases, sin and sickness, be the remover of fear of death, be full of divine qualities and be the strength of eternal laws". The hymns invoking waters and the prayers directed to Lord Varuna, the presiding deity of waters, reveal that even as early as that of the Vedic period people took precautions to use only water free from all sorts of impurities and that great care was taken for an adequate supply of unpolluted water.

A study of ancient and medieval literary Sanskrit works and other texts also reveals that people in ancient India must have had a plentiful supply of water for drinking, cooking, washing and other purposes. They were particular that water for municipal purposes, for drinking, for general domestic and industrial consumption should be hygienically safe, reasonably soft, practically colourless and free from objectionable odour and taste. Generally, water must be free from various types of impurities. For medical treatment, water having specific qualities was prescribed for different types of diseases. Giving considerable thoughts to all these aspects, people of ancient and medieval India put great effort to test and analyse different types of water collected in different places and in different seasons.

CLASSIFICATION OF WATER

In the modern period, water is generally classified as hard, soft, medium hard and saline in accordance with its physical and chemical properties. Caraka and other sages of ancient India have said that the entire water is ultimately of one type, viz., the one which falls from the sky as directed by Indra.

*jalamekam vidham sarvam patatyaindram nabhastalāt |
tatpatatpatitam caiva deśakālavapekṣate ||*

— Caraka Saṃhitā Sūtrāsthānam, 196

It was believed that Lord Indra directs the fall of water from heaven according to the activities performed by the mortals. This water while falling and having fallen from the sky acquires properties depending upon time and space.

Modern scientists say that absolutely pure water consisting only of H₂O, free from

any dissolved matter, optically void is a laboratory curiosity and most difficult to prepare. Such a water could be soft, colourless, odourless and would have a pH value of 7.0. But our ancients could distinguish this type of water known as *antarikṣam* and this becomes clear from the statement of Suśruta :-

*pānīyam antarikṣam anirdeśyarasamanṛtam
jīvanam tarpaṇam dhāraṇam āśvāsajananam
śramaklama pipāsā madamūrccātandrānidrādāha
prasāmanam* - *Suśruta Saṃhitā, Sūtrasthānam, 45.3*

Water produced in the clouds when they start dropping down has no taste, no odour. It is absolutely pure and beneficial like nectar. It gives and sustains life, quenches thirst, cures wounds caused by weapons etc., and revives the consciousness of those who faint due to fatigue, gives clear knowledge, removes drowsiness, burning sensation of the body, etc.

Even though it is said in our ancient texts like *Cāraka Saṃhitā* that entire water is ultimately of one type, water was broadly classified into two sorts, *divya* and *bhauma*. *Divya* is that which falls from the sky and this is again of four types, viz., *dhārna*, *kāra*, *tuṣāra* and *haima*. *Dhāra* is the rain water which drops from the sky continuously, *kāra* is hail stones, *tuṣāra* is snow water and *haima* is the water from the dew. Rain water is again classified as *gāṅgam* and *sāmudram* based on seasonal variations which are responsible for bringing about the various merits and the demerits of water. The *gāṅga* type of water is that which is not contaminated with dust, poison etc., where as the *sāmudra* type of water is contaminated. Generally, *gāṅgam* water rains in the month of *Āśvayuja*.²

Among the *bhauma* (surface or ground waters), the following nine types are enumerated :

- 1) *Nādeya*, water of rivers emerging out from mountains and flowing in the fertile regions and this water will have the tinge of sapphire.
- 2) *Niṣyanda* is the slightly warm and clear water obtained by making a pit in sand with the hand.
- 3) *Sārasa* is the water having lotuses and lilies and collected from streams flowing from rivers and mountains.
- 4) *Bhauma* is the clear and tasty water with the hue of blue lilies collected from ponds and wells.

- 5) *Kauṇḍa* is the water found in the midst of long rocky reservoirs. This water will be sweet, clear, resembling *asatipuṣpa* and having therapeutic values.
- 6) *Taḍāka* water is that which is collected in large lakes by constructing stone culverts and which is mixed with fresh water every year.
- 7) *Nairjhara* is the soft, clear, tasty water of water-falls which flow down by piercing the rocks of mountains.
- 8) *Vārṅṣa* water is obtained from trees, like the coconut water. This is very tasty, nourishing and refreshing.
- 9) *Audbhida* is the water which gushes out with force from a spring.³

PROPERTIES OF WATER

Our ancients had tested the properties of water falling from the sky and also of water fallen on the ground. The properties of water vary according to the particular spot in the sky with the predominance of one or the other *mahābhūtas* or elements from where it has fallen. The seasons and also the particular place on the earth where it has fallen affect the properties of water. While in the sky, water not only comes into contact with the moon, the air and the sun but also with earth in the sky in the form of dust particles and poisons of insects etc. carried through the air. Hence the contact of water with all these bodies ordained by seasons and the seasons themselves play a very important role in bringing about specific qualities in water after it has fallen down on the earth. Hence water gets in touch with various properties of the earth according to seasonal variations.

It is said that water falling on earth with different colours like red, grey, reddish white, blue, etc., have sweet, sour, saline, pungent and bitter taste. But the general opinion is that the five elements mutually combining in different proportions cause different tastes in water. On that particular ground where the quality of *pṛthivī* is more, water has sour taste and is salty. Where the element of water is more, it has sweet taste. Where the quality of ether is predominant water has no taste i.e., taste does not get manifested. This type of water is recommended as the purest type of water.

The classification of water as *gāṅgam* and *sāmudram* is also based on the seasonal variations which are responsible for bringing about the various merits and the demerits of water. The *gāṅga* type is said to be pure while the *sāmudra* type is said to be contaminated. The rain water falling in the month of *āśvina* (september-october) is said to be free from dust, poison, etc. Even the dust which comes into contact with water does not pollute it by virtue of its neutralising factors in the season. Hence even *sāmudra* water collected during the month of *āśvina* may be used. Suśruta has mentioned

that *sāmudra* type of water is not to be taken except the one available during the month of *Āśvina*.

Sāmudramapi āśvayuje māsiḡrhitam gāṅgavadbhavati

- *Suśruta, sūtra 45.7*

A test is prescribed to find out these two types of water, *gāṅgam* and *sāmudram*. A lump of cooked rice should be placed in a pure and untarnished silver vessel and rain water should be collected in that vessel. If the rice does not change colour and remain as it is, the rain water is *gāṅgam* and is fit to be used for different purposes ; if the rice changes colour, the water should be taken as *sāmudram* which is not fit for use except in the month *āśvina*. Perhaps the test is meant to find out the existence of sulphides in water which is not good for consumption.

Suśruta has accepted the wholesomeness of rain water available in the month of *āśvina*. According to *Hārīta* and others the rain water available in the month of *kārtika* and *agrahāyāṇa* (october-december) is also wholesome. Many commentators have recommended *āśvina* as the best month for collecting rain water. From these statements it becomes clear that our ancients were advising people not to use rain water of the rainy season as snakes, insects, spiders etc. move in the sky carried by clouds and so the rain water gets contaminated with their poison. Hence they are not fit for use before the month of *āśvina* or advent of autumn. It is also advised that rain water collected during this period may be filtered with fine cloth, or water that had fallen on clean terrace-surfaces may be collected and may be stored in golden, silver or mud pots and may be used in all seasons.

QUALITY OF WATER

1. Rain water : By nature, rain water has six qualities, viz. coldness, purity, benevolence, pleasantness, clearness and softness.

*śītam śuciśīvaṃ mṛṣṭam vimalam laghu śadguṇaṃ
prakṛtyā divyaṃ udakaṃ*

- *Caraka, sūtra 198*

The qualities of rain water after falling on the ground are determined by the place of the fall. After its fall on the earth, since the rain water gets in touch with the inherent properties of earth like cold, heat, unctuous, ununctuous, etc., properties change according to the receptacle and season also. If rainwater falls on the earth of white colour, it becomes astringent in taste. On yellowish white earth, it is bitter; on brown earth it is alkaline. On saline soil it is also saline and on mountain valley it is pungent in taste and on black soil it becomes sweet in taste. These six properties are acquired by water after it falls on the ground.⁴

Rain water falling from the sky as ordained by Indra and collected in a suitable receptacle is known as *aindra*. This is the excellent type of water. Tastes are not manifested in the rain water, hailstones or snow water. Water which is slightly astringent and sweet in taste, exceedingly thin, non-slimy, soft and non-greasy is the best to be taken.⁵

Rain water available in the rainy season is heavy and greasy. During the autumn it is thin, light and non-greasy. Persons with delicate health and those accustomed to taking predominantly unctuous food are advised to use this water in the preparation of masticable and eatable food, linctus and drinks. Water available in hemanta (winter) is unctuous, aphrodisiac, strength-promoting and heavy. That of *sīsira* (latter part of winter) is slightly lighter and alleviates *kapha* and *vāta*. Water available in spring is astringent, as well as sweet and ununctuous. Water in summer is not greasy. Thus great physicians and seers of ancient India were aware of the different properties of rain water in different seasons. Water collected from untimely rains is undoubtedly unwholesome and it is advised that such water should be avoided. Since water of the autumn season is the best, this water should be collected in suitable large receptacles and used by kings and people of delicate health.

2. Ground water : If *gāṅgam* water is not available, water which has fallen on the ground i.e., surface water can be used. Among them also water fallen on a spot having more of *akāśāguṇa* is considered to be the best. Among the different types of surface waters such as *kaupam*, *nādeyam*, *sārasam*, *taḍāgam*, *prasravaṇam*, *audbhidam*, *cauṇḍyam* etc., *audbhidam* should be used in rainy season.

In the season of autumn, all types of ground waters can be used. During this season all waters are clear, free from any *doṣa* or pollution. In *hemanta* season *taḍāka* water is the best. In spring and summer, *kūpodaka* and *prasravaṇodaka* are prescribed. In rainy season, *cauṇḍya* may be used or old water (not fresh) and water not touched by rain water may be used.⁶

tatra vaṣāsu antariksam audbhidam vā sevata |
mahāguṇavatvat saradisarvam prasannatvāt |
hemante sārāsam taḍākam ca! vasante kūpam
prasravanamvā! grīmeṣyevam! prāvṛṣi cauṇḍyam |
anavam anabhivṛṣṭam sarvam ceti ||

- *Suśruta*, sūtra 45.8

Our ancients had given considerable thought to find out the quality of water of different seasons and different surfaces because the purity and the quantity of available water are very important in locating new residential colonies, hospitals, gardens, etc.

3. River waters : Among the surface waters, river waters are comparatively soft i.e., low in mineral content and are most likely to contain easily soluble salts and

sediments. Therefore, different types of river waters with their therapeutic effects etc. are also discussed in several Sanskrit texts.

It is said that the waters of rivers originating from the *Himālayas* and with their waters dispersed, disturbed and hit by stones are sacred and wholesome. The rivers originating from the Malaya mountains and those carrying stones and sand possess clear water like nectar.

*nadyaḥ pāṣāṇavicchinna vikṣubdhābhihatodakāḥ
himavatprabhavāḥ pathyāḥ punyāḥ devaṛṣisevitāḥ*

Caraka, sūtra 209-212

The general opinion is that rivers flowing towards the west possess wholesome and clear water and those flowing towards the eastern sea generally possess soft and heavy water. Vindhya and Sahya ranges are responsible for diseases of head, heart, skin diseases including leprosy and filaria.

Rivers carrying rain water which are vitiated by mud, insects, snakes, mice and dirt are responsible for all diseases. The other surface waters like pond, well, lake etc. share the merits and demerits of the places in which they are situated, viz., marshy land, hilly areas, deserts, etc.

*anūpaśailadhanvānām guṇadoṣaiḥ
vibhāvayet*

- Caraka, sūtra 214

In this manner, great thinkers of ancient India have elaborately discussed the merits and demerits of different types of waters, of different places and of different seasons.

WATER POLLUTION

Apart from the suspended impurities like moss, dry leaves, rotten grass, etc., six types of pollution are mentioned, viz., *sparsā, rūpa, rūsa, gandha, vīrya and vipāka*. Different types of adverse effects are caused by these six types of pollution and many methods are also prescribed to get rid of these pollutants and make the water fit to be used for different purposes.⁷

Only for the past few years scientists of modern times are turning their attention to arouse an awareness among the people about the polluted atmosphere, especially the hazards caused by water pollution. But our ancients had already thought of it and had cautioned the people against using harmful water for various purposes. They were aware that river-waters were comparatively soft and most likely contained soluble salts and sediments. Ground waters from deep wells are usually free from

suspended matter and are much harder than the surface waters in the same vicinity. They knew that in regions of heavy rainfall surface waters contain less mineral matter because of dilution.

PURIFICATION OF WATER

Suśruta has explained the six types of pollutions, viz., *sparsā doṣa*, *rūpa doṣa*, *rasa doṣa*, *gandha doṣa*, *vīrya doṣa* and *vipāka doṣa* and has given the ill-effects caused by consuming or using water with these *doṣas*. He has prescribed a few substances like clearing nuts, *gomedaka*, lotus-bulbs, moss, pearls, thick cloth, etc., with which impurities including suspended ones can be removed from water.

tatra saptakaluṣasya prasāadhanāni santi |
tadyathā katakagomedakabhisagranthi-
śaivālamūla vastrāṇi muktāmaṇiśceti ||

Suśruta, sūtra 45.13

Boiling, making sunlight fall on the water, adding fragrance by dropping flowers in the water, dropping red hot iron balls, sand, lump of mud (alum) in the water and allowing it to clear are some of the methods prescribed for purification of water. Water heated by the sun's rays is considered to be very good like *gāṅgam* water. When heated by the sun, the bacteria, etc. are destroyed and when cooled in the night, water becomes soft and light. Therefore, it is advised that water should be fetched from rivers and lakes at dawn. *Haṃsodaka* waters heated by the rays of the sun and cooled in the moonlight are said to be pure. Water was also treated with purifying ingredients and perfumed with fragrant flowers. Such water was called *saṃskṛta jalam*.

haṃsodakam tathā cānyam kriyāsaṃskāra sambhavaṃ |
divā sūryāṃśusaṃtaptam rātraucandrāṃśusūitalaṃ ||

— *Śivatattvaratnākara*, VI. 20.66

PRE-TREATMENT OF WATER

If the water gets polluted and becomes pungent, bitter, tasteless, saline or malodorous, it is advised that *arjuna*, *musta*, *uśīra*, *nāgakesara*, *kośātaka*, *āmalaka* together with *ketakaphala* should be thrown in the water. This will make the foul water transparent, tasteful and fragrant and in addition will confer on it many other good qualities.

A lump of earth (alum), well-mixed with *phana*, *mustaka*, *ela*, *uśīra* and *candana* should be baked well in the fire of *khadira* and then dropped in water. This type of treatment is called *piṇḍavāsa* and alleviates all ailments. Similarly, treatment of waters

with flowers and powders are also described. They are called *puspavāsa* and *cūrṇadhivāsa*. Such treatment will, to some extent, remove the *sparsā*, *rūpa*, *rasa* and *gandha doṣas*.⁸

Another recipe for clearing water is as follows: mixture of *añjana*, *musta*, *uśīra*, *rājakośataka*, *emblic myrobalan* and *kaṭaka* nuts were used in order to impart clarity, good taste and other qualities of water.⁹

A few methods of preserving and storing water and cooling water are also given in the texts. Water should be brought in containers made of coconut shells or in earthen or copper pots. Water from the containers should be poured out through tubes. The containers may be wrapped in wet cloths or kept on clean sand to maintain the coolness of water. Pure water should first be sweetened with a piece of sugar candy by dropping it in the water. Then the water should be cooled by placing the same in the cooling machines of *pūgapaṭṭa* (bark of areca). After filtration, the water should be poured in different vessels and perfumed with the essence of fruits and flowers. Drinking water can be rendered tasty in this way.

PREDICTION OF RAINFALL

Rain god was invoked by many mystic chantings, sacrifices and rituals in ancient India. Since Indians believed that the prosperity of a country depend on the amount of rainfall received by it, amount of rainfall was often predicted and rainfall of different regions was also ascertained.¹⁰ The *Kṛṣiparāśara*, an ancient work, has described at length the planetary influence on rainfall. After categorising clouds as *āvarta*, *saṃvarta*, *puṣkara* and *droṇa*, this work supplies interesting information on the method of forecasting rainfall in a particular year by observing natural phenomena like the first flash of lightening, course of wind, etc. Immediate rainfall also could be predicted from the sudden croaking of frogs, rising of ants with eggs from their holes, dance of peacocks and so on. Our ancients were able to distinguish these clouds as the same text says that of the four types of clouds one becomes predominant in a particular year. *āvarta* rains in particular areas while *saṃvarta* rains everywhere.¹¹ When the cloud *puṣkara* is predominant, rainfall becomes scanty and during the dominance of *droṇa* rainfall becomes plenty, Kauṭilya of the 4th century BC has mentioned that three clouds rain continuously for seven days, eighty clouds pour minute drips sixty clouds appear with sunshine.¹² Of course, the texts like *Kṛṣiparāśara* contain many more details regarding the measurement of rains, *garbhalakṣaṇa* of the clouds, *garbha dhāraṇa* and *pravarṣaṇa* of the clouds.

From these varied sources we can gather that ancient Indians were probably the greatest water harvesters in the world. They evolved a vast variety of water harvesting systems for agriculture, drinking and other household purposes. These practices bear testimony to a highly specialised surface hydrology and water management in ancient

India. The art of ascertaining presence of water underground, known by the name *dakargalasāstra*, had also reached a fairly developed stage.

CONCLUSION

The production of water for different purposes involves procurement, treatment or purification and distribution. Large number of lakes, tanks and ponds were dug and river water also was made use of in plenty. In smaller cities where ground water was sufficient, water was obtained from wells. Artesian or deep wells were also used for irrigation. Water was procured and preserved in large reservoirs. Impurities and undesirable substances such as sediment, bacteria and dissolved matter did have a bearing on the choice of water supply source, but all impurities were removed by proper treatment.

From the above discussions we come to know that our ancients knew many methods of removal of colour, odour, suspended matter and bacteria from surface water and in some cases removal of hardness and also the protection of water against recontamination. Coagulation, filtration, disinfection were the standard treatment adopted apart from the removal of colour and odour. Coagulation was accomplished by adding some metals and red hot iron balls. Filtration was done through cloth or fine sand beds to eliminate turbidity and bacteria. Alum was used for sedimentation. Even though addition of chlorine is not mentioned in the ancient texts, we can presume that disinfection was effected by exposing the water to sunlight and cooling the same in the moonlight because these provide ozone and ultraviolet light.

The chemical and physical properties of different types of water were thoroughly studied by the people of ancient India and this enabled them to select the correct type of water for different purposes. In ancient India, though ground-water was used in plenty and wells were sunk in many places, steps were also taken to check soil erosion by afforestation. Irrigation tanks were well-maintained and periodically desilted. Some texts on agriculture speak of percolation tanks and bunds in drought-prone areas where flash floods were transient. No doubt hydrology was highly advanced in ancient India.

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tatra gāngam āśvayuje māse prāyaso varṣati || - Suśruta saṃhitā.
With Hindi translation, Ambikudatta Sastri, Vārāṇasi. 1166, Sūtrasthānam. 45.7.*

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5. *ibid. Sūtra*, 201, 202
*Īṣatkaṣāyamadhuram susūksamanvisādam laghu |
arūḳṣamanabhiṣyandi pānīyam sarvamuttamam ||*
6. Cp. *Śivatattvaratnākara*, VI. 20. 69-73
7. Cp. *ibid.* VI 20.67
*sakardamanī saśaivālam pālvalottham ca pālvalam |
varjayedūṣarodbhūtam gandhavarnadi dūṣitam ||*
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