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TITLE : Water and its quality in ancient encyclopedias of Karnataka

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Abstract

Following are the three major ancient encycloperias that are available in Karnataka where in the useful data is recorded:

Sl No.	Name	Language	Period	Author
1	Lokopakara	Kannada	1125 AD	Chavundaraya King Someswara of Kalyani Chalukya Dynasty
2	Manasollasa	Sanskrit	13th Century	-do-
3	Shivatava Ratnakar	Sanskrit	17th Century	Keladi Basavaraju

They contain the information about the formation of clouds , surface water and ground water, as well as its quality. They also describe the methods of preservation of fresh potable water. It is interesting to note that some of water bodies built during the above mentioned period are still in useful condition.

1. Lokapakara: Water quality varies with the soil wherein it exists. The soils is represented by natural colours which will have the different tastes i.e., acidic, basis etc., Forecasting the rain fall from rainbow formation. If the colour depth is more blackish that indicates the drought condition. The effect of rainbow if it falls on forest, hassock, or on water is clearly explained. This information can be made use by taking the rainfall data of a particular region.

2. Manasollasa: Water available in nature is divided into 9 varieties of water viz., Divya, Antariksha, Nadeya, Nirjhara, Sarasa, Bhwoma, Chounda, Tadaga and Oudbhudha. There is an inscriptional evidence at Hampi which is called as Varate Mylara representing the Nishpandana Jala or a small spring. Laxmindhara's inscription mentions Tadaga or kere and the ground water as baave.

3. Shivatatwa Ratnakara : Apart fro;m the 9 varieties of water mentioned above, this work categories another 3 classification wherein the Naarikela or the coconut water which is used even now also, instantaneously to feed the mineral content to affect to affected person. Methods of purification of water by aromatic therapy, preservation of then good quality of water and its effect on the physiology are economical, accessible to Indian conditions. As we all know that (so called) mineral water is costlier than the coconut water itself.

This paper through light on such indigenous, valuable information available in these treatises of Karnataka on ***water and its quality which is un explored hither to by either hydrologists or Scientists.***

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Water and its quality in ancient Encyclopedias of Karnataka

There are three major encyclopedic works produced by the authors of Karnataka wherein the useful Hydrological information is available:

	Name	*Language*	*Period*	*Author*
1.	Lokopakara	Kannada	1125A.D.	Cavundaraya
2.	Manasollasa	Sanskrit	13th Century	King Someswara of Kalyani Chalukya Dynasty
3.	Shivatattva-ratnakara	Sanskrit	17th Century	Keladi Basavaraja

These works record the useful hydrological data regarding the formation of clouds, surface water and ground water and their quality. The traditional method of preserving potable water is also mentioned here. It is interesting to note that some of the water bodies built during the above mentioned period are still in useful condition. This paper contains only a bird's eye view of such information.

Lokopakarm

This is the first encyclopedia written by Chavundraya (1025 A.D.) in kannada Language. He was a Sarvadhikari in the court of Jayasimha of Kalyani Chaluka Dynasty. Fourth and fifth chapters of this work consists of Hydrological information, some important aspects of which are narrated below.

Rainbow and its effects

Sunrays' passing through the air medium to the cloud medium gets refracted and causes rainbow due to the dispersion of light which is defined as *Indra Dhanu*[1]. This concept of formation of a rainbow by refraction of light coincides with the theory of light put forward by Newton in 1666 A.D. after 641years. The author further continues to prove that forecasting of rain or draught etc., is not merely accidental. The rainbow in the horizon with deep and pale colours at different ends indicates a good rainfall[2]. If the intensity of black (Indigo) colour in the rainbow is more and seen on water, it results in severe draught[3]. If there are two rainbows, out of which one is the mirror image of the other, it depicts the good rainfall. The plants grow well, if the rainbow is seen over the trees. This will be reverse when seen on the earth. While raining, if the rainbow formation takes place, then the rain will stop. When there is no rain and if the rain bow appears, then it indicates a good rainfall.

The fifth chapter titled *Udakargala* consists of 40 verses that explain the methods of obtaining ground water as well as its quality. The interrelation of Hydrology, Botany and Geology is narrated here. The author refers to Brihatsamhita of Varahamihira (6th century A.D.), Mandacharya and other authors. It means that this information was in vogue at least from 6th century. It is important to note that the same is being referred to time and again, by the authors of future works, like Manasollasa and Shivtattvaratnakara.

Manasollasa

This work was written by Kalyani Chalukya Chakravarthi Sarvajna Someswara is a compilation of many disciplines like medicine, Science of breeding the Elephants and Horses, fine arts, water and its quality etc.,

Water quality

According to the author water is classified into nine varieties. Viz., Divya, Antariksha, Nadiya, Nirjhara, Sarasa, Bhouma, Chounda, Tadaga and Oudbhuda.

Divya

The formation of cloud during the ascent of Swati Nakshtra, when the Sunrays pass through these clouds, the rain water has the quality of curing the diseases. This sweet water is called Divya Jala.

Antariksha (Sky Water)

Rain water directly falling from the sky that is equal to Spatika (white or pure) stone is known as Antariksha Jala.

Nadiya Jala

Water flowing in the form of a river that takes birth in the mountains is called Nadiya Jala.

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[1] *Surya rashmigal Galiya hoylininde aneka varnamagi modamagirda thavinalli Indradhanuvante toral Indra Dhanuvember*

[2] Picture No.1

[3] *Krishna varnamagi toridode pervasamam pelvudu (perbasa = severe draught)*

Nishpandana Jala

Water produced where the sand is dug merely by hand is called Nishpandana Jala. Now most of the springs are dried up because of over exploitation of ground water in Karnataka. The area of the spring should be kept clean. There is an inscription at Orate Mylara near Hampi which speaks about this water as Orate. It is a known fact that spring water contains some special minerals in it.

Bhouma Jala

Water produced from the under ground is called Bhouma Jala. This water will have the colour of Neelotpala(kannaidile= blue lotus), which is sweet and clear water.

Kounda Jala

Water gushing out from the middle of the big rock is calld Kounda Jala. This water has the colour of Sogase flower(Linum). This can cure some diseases. The taste of the water is sweet.

Tadaga Jala

Water stored in a tank built by using different types of stones is called Tadaga Jala. The tanks should be filled by fresh water every year. Such water bodies built during Badami Chalukya period (6^{th}- 7^{th} Century) are still used by the people at Badami and other places around it.

Shivatattvaratnakara :

This encyclopedia narrates the following facts:

Formation of clouds, direction of rainfall, and its Characteristics Effect of air on clouds and rainfall Rain forecast Ground Water, Correlation between the plants and water bodies Types of water and its quality Collection and preservation of potable water

Formation of clouds

According to the author the formation of cloud takes place due to the union of water particles, fog, air, and fire (heat produced due to friction or difference in temperature) and pours down to ground in the form of rain,[4] with the air pressure, they pour water about six months with the intension to do welfare to all the beings on earth. It is almost in the same manner the rainfall of a Water Year, is accounted as Monsoon (June to November) and Non Monsoon (December to May), of six months each. If the rain fall happens on Deepavali, Tuesday or on Sunday it will not be good. The forecasting of rain should be calculated for a period of 15 days only. Clouds formed in the night will rain in the day time and vice versa. Clouds formed in the East will bring rain to West, and the West to the East. There are 9 types of clouds. Viz., Avarta, Samvarta, Pushkara, Drona, Kalika, Kaala, Neela, Vaaruna and Vaibhava (Verse No.93 to 97).

Ground Water Resources

Soils that are having different colours like brown, white, sand, quartz, contain water inside. It gives the clue which the author knows about the absorption and retention capacity of water by such type of soils. He gives many examples to confirm his view. If the colour of the soil turns from white to yellow, at a depth of three and half feet at the Western side and if there is a termite, there will be water at a depth of about 12 1/2 ft. The Banyan tree having more twists and termite towards its Northen side, about 18 feet of water will be available in that place.

[4] *Jaladhoomagni Vayoonam samyogow tymbhavantite varinyivatuvarshanti verse No.58, Kallola 3,Taranga No.1*

Along with 9 types of classification mentioned above, the author especially mentions the natural mineral water called Narikelajala (tender coconut). By drinking this water, the person gets the required mineral content like potassium, to the body instantaneously. The earth having the quartz and copper contents, the taste of water will be bitter, brown or white or blue colour which leads to hardness of water.

The pure quality of water mentioned above should be collected in vessels of copper, well washed three times before use. King should drink this water by using Gold vessels only. The common people can collect the water and use it from the earthen and copper vessels. The mouth of the container should be closed with white muslin cloth. Water should be collected before the sunrise and it should be filtered before storing.

Pre-treatment of water

Pushpavaasa

Before drinking the water it is to be treated with mango juice, fresh petals of rose, Utpala and Champaka (Verse 21). It seems, the scientific analysis of this aromatic treatment has a greater scope.

Conclusion

From the above discussions it can be concluded that the Hydrological aspects such as clouds source of rain, rain forecast, construction of water bodies , which were in vogue, are clearly documented in ancient Encyclopedias of Karnataka since 6th century A.D.

In modern times the water quality is classified by its parameter contents like Ph, Electrical content, Mineral Contents, and Bacterial analysis etc., based on its utilities in Agriculture, Industries, etc., whereas in the ancient times, it was classified according to the source of origin.

The knowledge of formation of colours when the Sunrays pass through different media like air, wet water particles by means of dispersion of light is well defined in Kannada work of 1025A.D. by Chavundaraya, well before Sir Isac Newtons colour Principle in 1666 A.D. showing the rainbow as its natural proof. He also explained the inverse formation of rain bow and its effects on rainfall, draught etc., Even though the formulae or the models were not recorded in the Lokopakaram, it is to be noted that colorographic Analysis existed and utilized by the people of those even before the invention of modern sophisticated instruments.

- Courtesy : Smt. S.Malathi,
- Shri. N.Suryaprakash C W C
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- Rainbow on Earth - Predicts plants does not grow well
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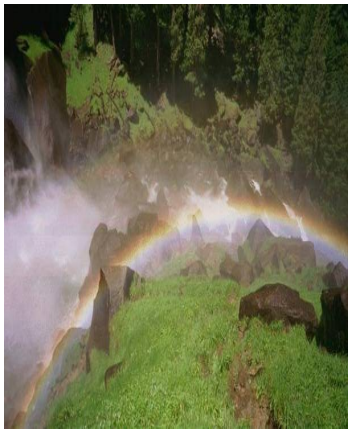

Picture-No 1 - Mirror Image of Rainbow – Indicates good rainfall