

## Assessment of Reservoir Sedimentation using Remote Sensing and Recommendation for Desilting in Bisalpur Reservoir

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### Abstract

*Deposit particles that begin with the decomposition of structures in the basin extend to near the conduit. Exactly when the duct flood is secured in a supply, the accumulation is established in the file and its capacity decreases. Dropping the limit furthest from a store on a long way beyond a more distant point avoids the idea for which it was created. Consequently, the evaluation of the sediment oath ends up being fundamental for the organization and strategy for these supplies. Some consistent methods, for example, hydrographic survey and input overflow methodologies, are being used to evaluate the explanation of store development, but these techniques are uncomfortable, monotonous and extravagant. There is a need to do fundamental procedures, which require a part of the time and are practical. Through this examination, an approach of remote identification of distinctive roads with respect to the evaluation of sedimentation in the Bisalpur reservoir, disposed of in the Banas River, has been investigated. The multi-hour remote reference data (LISS-III) gave information about the water distribution area of the supply, which was used to calculate the degree of sedimentation. The most remote changes of the store between the most extraordinary and minimum levels were calculated with the trapezoidal formula. It was recognized that the recoil in the restricted vault due to the affirmation of the accumulation over a period of twelve years (2007-2017) was 296 mm, which gives an ordinary sedimentation rate of 26.91 mm/year. The ordinary sedimentation velocity using hydrographic exploration data for a comparative period was 22.54 Mm/year. The equality of the results shows that the sedimentation rate studied using the strategy based on remote identification was close to the isolated results of the hydrographic survey.*

**Keywords:** *Bisalpur, cumulative limit; to stock; deterioration; hydrographic review; remote reconnaissance; Sedimentation.*

### 1. Introduction

Remote sensing is a focused issue and has an extraordinary use for its use in the region of water resources, particularly in the advancement of water resources and its capable organization. The tremendous cost of the country needs an increasing amount of advances such as remote reconnaissance and GIS to know and try to use water resources (Jaisawal et al., 2003). Examining spatial stage data can help store volume revisions. Remote multi-date satellite distinction data provides information about height-form districts, especially as water spreads through an area. Any fall in the water from the tent of an extended area in a rising saw preordained by the satellite is normal for the explanation of the waste (Shanker, 2004). In this way, by looking at the assortments of the water distribution regions in several intense levels of the file, one can evaluate the measurement of the pile of surpluses that have been established over time.

The use of remote identification frames to review the suspended waste has been represented by a pair of analysts (Solomonson, 1973, Bartoluci et al., 1977, Holeyer, 1978, Khoram, 1981).

Johnson et al. (1980) perceived the sedimentation in the reservoir of the high dam of Asuán by differentiating the reflectance greetings in the green and red parts of the show. The surface area of the aggregate store was developed by adding up all the pixels called water. Test descriptions show that sedimentation in the middle of the surge time interval was for the most part bound to the key supply conduit channel and the powerful reservoir. The domains of extensive sedimentation were found and the amounts of explanation resolved through the soil on the web. This information was used to anticipate the dispersion of deposit stores in the vault.

Rao et approach. (1985) used a remarkable examination technique on notable Landsat-MSS images to evaluate the water distribution district at different levels of the Sriramsagar reservoir. They used these water distribution assessments to study the capacity of the supply and touched the bottom line by arriving at the conclusion that the results are comparable to the insights of the hydrographic perspective.

Mohanty and approach. (1986), who pointed out point by point that, to the extent possible, curves transmitted using remote recognition data were generally similar to the pairs eliminated from conventional systems.

Vibulsresth et al. (1988) used powered methods in which the Landsat-MSS near-infrared (IR) thickness was cut off to remove the portion of the water extension from the Ubolratana store in Thailand. They connected the areas inscribed at water levels and calculated, as much as possible, the perspective of the area of the surface obtained using cone formulas.

To see the use of water in a bimonthly store/month by month, Jagadeesha and Palnitkar (1991) used satellite data to select the water supply area at different stages of supply and the ordinary water requirements. Performance in different periods of progressive progress.

The collection of information on the zones was obtained in the same way from the satellite data. They obtained the suggestion of Borland and Miller (B & M) to find the case of the dispersion of sediments deposited between several areas of the store.

Goel and Jain (1996) obtained a feed sedimentation test using the thickness cutter frame to clean the dispersal zone with water. They used IRS-1A data (LISS II) to study the sedimentation of the vault in the Dharoi reservoir. The circumstance of the studies shows that the remote reconnaissance approach was not used for sedimentation in the Himalayan region, which has authentic places that cannot be destroyed.

## **2. Study Area and Data Collection**

### **2.1. The Study Area**

The dam of Bisalpur arranged in Tonk, Rajasthan is selected as the examination area (Fig. 1). The Bisalpur dam was worked in 1990 by the government from Rajasthan, India; The life of the general public in the urban regions has changed, giving them enough water and, along these lines, benefiting in the framework and control of the water and thus passing the flowering towards the Northwest region.

The wandering of Bisalpur is a multipurpose effort, that is, a water frame with a path of drinking water supply. A dam length limit around 574 meters and 39.5 meters of work / stone dam height has been created cross-sectionally stream Banas near Bisalpur in the Tonk area to store 38.70 TMC of water CWC has adopted the hydrology of the Bisalpur Project in 1989 as evidenced by 75% reliability 33.15 TMC water is available on the site of Bisalpur Dam. As a result of the accounting

disappearance and various incidents, the usable water available is 24.2 TMC, which has been distributed for reasons of Water and water frame.



**Figure 1. Guide to the location of the Bisalpur reservoir**

Subsequently, the store has the ridiculous water level not long after the storm season. The water level of the supply by continuous, however, certainly reduces the prediction to a couple of types of use and touches the cut levels and the beginning of the tempest that accompanies it. The Banas River carries considerable levels of sediments, which is horrible for the life of the vault. The responsibility of the deposit in this well, as it was, in the light of deforestation, the excess of brushing in the field plots, the occasional development of treatments, the development in budding verandas, et cetera. The ordinary factors that, in addition, give credit to the high measures of transport of waste of the examination district are the abrupt topographical obliquity, the poor aid characteristics of the soils; stones rich in earth, for example, slates and shales of Spiti; and the proximity of the limestone stores in all cases (Sharma et, 1991).

## 2.2. Data Used

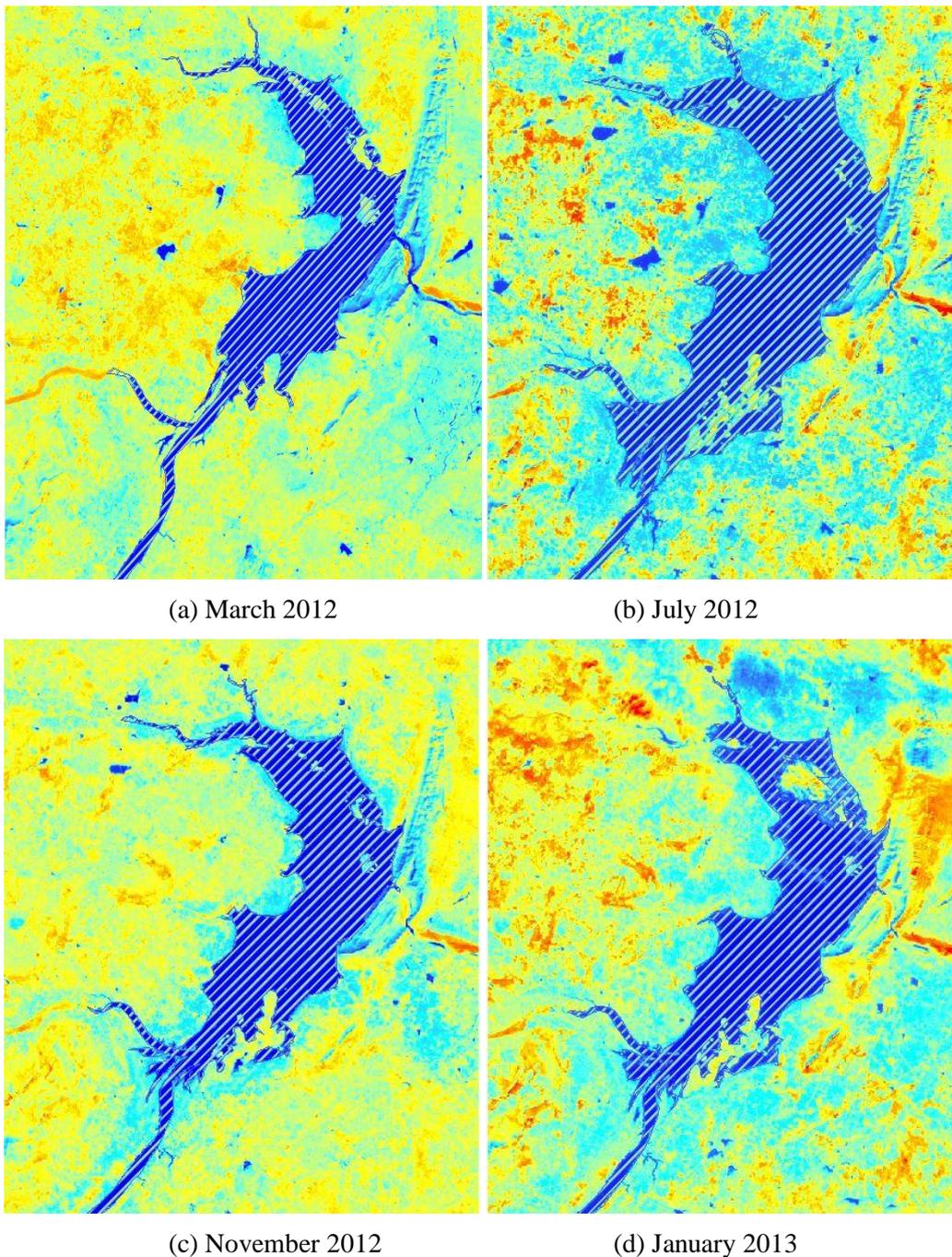
To evaluate the actual measurement of the waste stored in the reservoir of the Bisalpur dam and take a look at the doubts of the company, hydrographic surveys have been carried out in the supply every year from 2007 to 2017.

Satellite data, The multi-spatial data of the satellite LISS-III for the hydrological year 2012-13 is used to evaluate the discontinuous changes in the area of water propagation and the adversity of the volume. The four satellite extension dates for which data have been used are March 2, 2012, July 20, 2012, November 24, 2012 and January 13, 2013. In the same way, Survey of India (SOI) toposheets of scale 1: 50,000 and 1: 2, 50,000 were used. Field data The following information was obtained from the masters of the Bisalpur dam (HD) for examination. - Stage area data, stage capacity that contrast with the pre-dam audit in 1992.

## 3. Methodology

The mosaic of all the downloaded satellite data is done by programming ERDAS / IMAGINE, since the photos are covered in two connection scenes. To see the full image

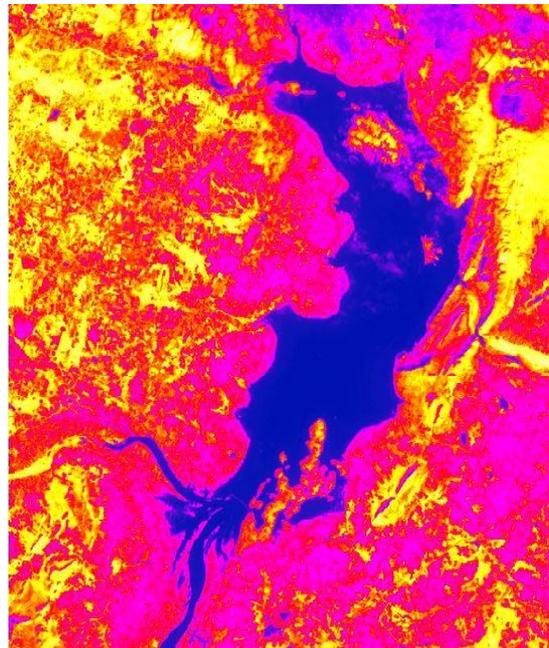
in one minute, mosaic of the scenes is required in a solitary scene of balanced metric radius.



**Figure 2 Satellite images obtained for different months and years**

Estimation of the water distribution area Water is one of the characteristics most easily delineated in the satellite data in light of the high separation between earth and water in the Near Infrared Band (NIR), where the water ingests a moderate imperative of the scene depending on the nature and state of the body of water while it arrives incorporated absorbs less depending on the cover that compose, brutality, piece, and so on. After inspecting the radio histogram of the image (RED / NIR), the degrees for the water arrival / confinement diagram should be perceived. The radio image can be restricted by turning the cursor over the FCC image with the numerical display of the radio image activated. These features containing all the water pixels were confirmed by directing the FCC

standard to change the break point. However, in most cases, the radio image threshold standard has not yielded adequate results to recognize the correct water pixels as a result of the shallowness of the water in a part of the zones along the periphery and the tail section of the store. Therefore, the authentic water pixels that were considered were evaluated by the radio image threshold (GREEN/NIR).



**Figure 3. Satellite decided to propagate the water from the Bisalpur store for the dates of the scaffolding considered for the examination**

For the tent restriction count between two stages of progressive supply, mostly three formulas are used, the prismoidal formula, the Simpson condition and the trapezoidal formula (Patra, 2001). Of these, the trapezoidal condition has been mostly used to calculate the point of rupture (Jayapragasam et al., 1980, Manavalan et al., 1990, Goel and Jain 1996). In this system, the cross-sectional districts of the range lines are outlined and these data, together with the surface areas at full supply level between neighboring areas, are used to process the waste volumes, as is done next:

$$V = \frac{H}{3} (A_1 + A_2 + \sqrt{A_1 * A_2}) \tag{1}$$

Where, V is the volume between two consecutive levels, A1 is the regional configuration of the channel in the increase 1, A2 is the area of the frame in the rise 2 and H is the difference between the ascents 1 and 2. The volume is treated sedimentation storage between two supply levels of the difference between the past confinement study point and the satellite information. Water, a separate area of the file was calculated from the satellite data and the level that contrasts with the date of the step was accumulated from the effort master.

**Table 1 shows the Data Analysis for various dates**

Sl. No.	Date of satellite	Observed Water Level (m)	Elevation Difference	Area (Mm <sup>2</sup> )	Capacity (Mm <sup>2</sup> )	Cumulative Capacity (Mm <sup>2</sup> )
				RS 2012	RS 2012	RS 2012
1.	02/03/2012	310.18	0.00	81.91		

2.	20/07/2012	312.03	1.85	113.46	319.852	319.852
3.	24/11/2012	312.53	0.50	113.83	726.688	1046.54
4.	13/01/2013	313.62	1.09	154.49	571.842	1618.382

From the Table 1 of the ascension region, the primary regions in the very attractive sizes (the offer increases in the dates of the passage of the satellite) were obtained by direct contribution. From the known estimates of the special regions and evaluated in different climbs, the limit of a class and redesigned were solved as indicated above. The overall reduction in the restriction between the most insignificant and essential water levels has been achieved by including as much as possible at all levels.

#### 4. Results and Discussions

The regional configuration of the water distribution has been learned using remotely distinguished data. The volume qualification between two consecutive levels was determined using the trapezoidal formula and is given in Table 1. In this review, it was considered that the modified containment point of the store at the most insignificant level observed (313.62 m) was the same as the main breaking point of the aggregate (1618.382 mm) in this size. At the most negligible level observed, as much as possible between the consecutive levels shown to reach interesting boundaries and redirect to the best level seen. The difference between the first consolidated stress and the studied one concerned the loss of the breaking point given the sedimentation in the living area of the feed. Table 1 shows the volume at different dates used to record the explanation of the waste in the warehouse.

The containment point for the year 2012/13, evaluated by remote identification techniques (1618.382 Mm), is subtracted as much as possible (1754.84 Mm) at a comparative level. Adversity in confinement (323 Mm) was attributed to the declaration of remains in the study area, between 313.62 m and 310.18 m from the store. In this way, it is estimated that the typical loss rate of the confinement point is 26.91 Mm/year for the "habitable zone" using remote recognition data. A review of the significant and revised total cut points obtained using the distance discrimination procedure for 2012/13.

The final result of the sedimentation scheme for dead and living loads is given autonomously (BPMB, 1997). It can be seen from this table that in the middle of a 11-year period, adversity in storage has the light of sedimentation is about 296 Mm, however, in the life limit, it is 268.25 Mm. Thus, as shown in this scheme, the ordinary sedimentation rate is 22.28 and 22.54 Mm/year for dead and living areas, independently. So to speak, the sedimentation rate in the living and dead reserves is almost the same. The sedimentation rate in the diet (26.91 Mm/year) obtained using the remote recognition approach is insignificantly higher than that obtained from the hydrographic survey (22.54 Mm/year). This higher sedimentation rate can be attributed to the confirmation capability of the water dispersal zone using remote identification techniques. In addition, the mixture of pixels that have a huge degree of ground and a smaller water level, such as those on the edges of the store, can have a similar impact on the results.

#### 5. Conclusions

The use of remote distinctive frameworks to evaluate the sedimentation rate in the Bisalpur Reservoir (located in the Banas River) shows that the long-term sedimentation rate over a long period (2007-2017) is 26.91 Mm / year, while discernments of the earth by hydrographic pattern sedimentation velocity of 22.54 mm for a comparable period. The highest sedimentation rate obtained using remote identification data can be clarified in light of the accuracy in confirming water, an extended area and the mixing of water pixels with the soil around the water limits of

the diet. In any case, the use of safer satellite data (spatial and community) may be an answer to these problems to a certain extent.

The use of a remote discrimination procedure involves a rapid and reasonably accurate assessment of the live mixing volume disaster due to sedimentation. Recognizing the time and cost associated with hydrographic surveys, it is recommended that hydrographic surveys be conducted at longer intervals and that sedimentation plans based on remote reconnaissance be performed over shorter periods, so that two surveys are conducted complete. In any case, there are some incarcerations in the process of aggregating remote credentials. For example, remote identification strategies provide volume information just in the water level deviation area, which is located around the active supply area. Below this zone, i.e. in the permanent load zone, the volume information could be taken from the most active late start with a hydrographic survey.

Confirmations Manufacturers express their sincerity on behalf of the Bisalpur Project Board (BPMB), Tonk, Rajasthan, India, for giving details of stores and water sizes on different dates and other appropriate information for examination. The assistance provided by Mr. K. Goel (National Institute of Hydrology, Roorkee) to this review is fortunately perceived.

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