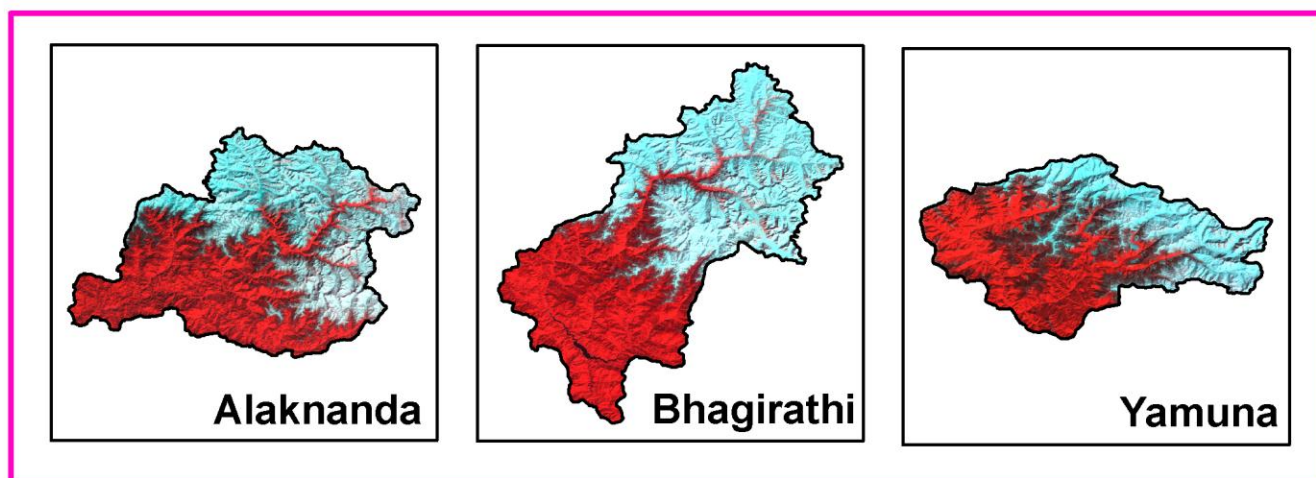


# SNOW COVER ATLAS OF GANGA BASIN

Sub basins: Alaknanda, Bhagirathi and Yamuna

(A Joint Project of Indian Space Research Organization and  
Ministry of Environment, Forests & Climate Change, Govt. of India)

Year : 2013-14



Uttarakhand Space Applications centre  
Dehradun - 248001

Space Applications Centre (ISRO)  
Ahmedabad - 380015

March 2015

# **SNOW COVER ATLAS OF THE GANGA BASIN**

**Sub-basins: Alaknanda, Bhagirathi and Yamuna**

**(A Joint Project of Indian Space Research Organization and  
Ministry of Environment, Forests & Climate Change, Govt. of India)**

**Year: 2013-14**



**Uttarakhand Space application centre  
Dehradun  
and  
Space Applications Centre (ISRO)  
Ahmedabad-380015**

**March 2015**

**SPACE APPLICATIONS CENTRE (ISRO), AHMEDABAD - 380015**

**DOCUMENT CONTROL AND DATA SHEET**

Report Number	SAC/EP SA/GSAG/GSD/SGP/SN/ 101 /2015
Month and year of publication	March 2015
Title	Snow cover Atlas of the Ganga basin
Type of Report	Scientific Report
No. of pages	76
No. of figures, Charts & Tables	56, 9 & 6
Authors	As per list
No. of References	9
Originating Unit	Geo Sciences Division, Marine, Geo and Planetary Sciences Group, Earth, Ocean, Atmosphere, Planetary Sciences and Applications area, Space Applications Centre (ISRO), Ahmedabad-15
Abstract	This atlas gives subbasin-wise distribution of snow cover in the Ganga basin from October 2013 to June 2014. The subbasins included in this report are Alaknanda, Bhagirathi and Yamuna. The areal extent of snow cover was estimated in fully automatic mode using Normalized Difference Snow Index (NDSI) based algorithm. For this purpose AWiFS sensor of Resourcesat satellite was used. This atlas gives snow cover products, statistics and seasonal snow depletion curve. It is expected that this data will be useful for hydrological and climatological applications.
Key words	Snow cover, NDSI, AWiFS, depletion curve, Alaknanda, Bhagirathi and Yamuna basins.
Security Classification	Unrestricted
Distribution	Among concerned

Authors

Space Applications centre (ISRO), Ahmedabad

B. P. Rathore

S. K. Singh

I. Bahuguna

A. S. Rajawat

Uttarakhand Space Application Centre, Dehradun

Asha Thapliyal

Anju Panwar

## CONTENTS

	<b>Page No.</b>
1. INTRODUCTION	1
2. STUDY AREA	2
3. DATA USED	2
4. NORMALISED DIFFERENCE SNOW INDEX	2
5. SNOW COVER MONITORING ALGORITHM	3
6. RESULTS AND DISCUSSIONS	4
ALAKNANDA BASIN	8
BHAGIRATHI BASIN	31
YAMUNA BASIN	53

## 1. Introduction

Snow covers almost 40 per cent of the Earth's land surface during Northern Hemisphere winter. This makes albedo and areal extent of snow as important component of the Earth's radiation balance (Foster and Chang, 1993). In addition, large areas in the Himalayas are also covered by snow during winter. Area of snow can change significantly during winter and spring. This can affect stream flow for rivers originating in the higher Himalayas. All the rivers originating from higher Himalayas receive almost 30-50 % of annual flow from snow and glacier melt run off (Agarwal et al., 1983). In addition, snow pack ablation is highly sensitive to climatic variation. Increase in atmospheric temperature can influence snowmelt and stream runoff pattern (Kulkarni et al., 2002). Therefore, mapping of the areal extent and reflectance of snow are important parameter for various climatological and hydrological applications. In addition, extent of snow cover can also be used as input for numerous other applications.

Mapping and monitoring of seasonal snow cover using field methods are normally very difficult in a mountainous terrain, like the Himalayas. Therefore, remote sensing techniques have been extensively used for snow cover monitoring. Snow cover monitoring using satellite images were started by using the TIROS-1 satellite from April 1960 (Singer and Popham 1963). Since then, the potential for operational satellite-based mapping has been enhanced by the development of higher temporal frequency and satellite sensors with higher spatial resolution. In addition, satellites with better radiometric resolutions, such as NOAA have been used successfully for snow mapping (Hall et al., 1995). This is possibly due to the distinct spectral reflectance characteristics of snow in visible and near infrared regions. India has launched series of Indian Remote Sensing satellite (IRS) to study the different earth resources. Previously launched satellites have flown with many sensors having different spatial, temporal and spectral resolutions. Recently launched RESOURCESAT-1 satellite has three different sensors namely LISS III, LISS IV & AWiFS with different spatial, temporal and spectral resolutions as desired for different applications. AWiFS (Advanced Wide Field Sensor) is an advanced version of earlier Indian satellite sensor WiFS (Wide Field Sensor) with improved spectral and spatial resolutions maintaining the same repetivity. There are a series of other polar orbiting satellites, like Landsat, NOAA and MODIS etc., which have provided information on different aspects of

snow. Geo-stationary satellites also proved their utility in mapping/monitoring the snow-covered regions. Information generated from satellite observations has been extensively used for snowmelt runoff modeling (Kulkarni et al., 1997).

## **2. Study Area:**

This Atlas gives distribution of snow cover in three sub-basins of the Ganga basin. These are Alaknanda, Bhagirathi and Yamuna sub basins. Locations of these basins are shown in Figure 1.

## **3. Data used:**

AWiFS data from October 2013 to June 2014 were used in this study.

## **4. Normalised Difference Snow Index (NDSI):**

In general, the reflectance of snow is high at the red end of the visible spectrum. It tends to decline in the near-infrared region until 1090 nm, where slight gain in reflectance occurs and gives a minor peak at approximately 1090 to 1100 nm. One of the important difficulties in snow cover monitoring is the presence of cloud cover. Cloud has strong reflectivity in visible, NIR and SWIR regions while snow absorbs in SWIR, and this difference can be utilized for snow/cloud discrimination. Normalized Difference Snow Index (NDSI) utilize the normalized ratio of green and SWIR and is used as an automated approach for snow mapping addressing the shadow and cloud problems in snow bound areas.

Normalized Difference Snow Index was calculated using the ratio of green wavelength (band 2) and SWIR (band 5) of AWiFS sensor:

$$\text{NormalizedDifferenceSnowIndex(NDSI)} = (\text{band2} - \text{band5}) / (\text{band2} + \text{band5}) \quad ..(1)$$

To estimate NDSI, DN numbers were converted into reflectance. This involves conversion of digital numbers into the radiance values, known as sensor calibration, and then estimation of

reflectance from these radiance values. Various parameters needed for estimating spectral reflectance are maximum and minimum radiances and mean solar exo-atmospheric spectral irradiances in the satellite sensor bands, satellite data acquisition time, solar declination, solar zenith and solar azimuth angles, mean Earth-Sun distance etc. (Markham and Barker, 1987; Srinivasulu and Kulkarni, 2004).

## **5. Snow cover monitoring algorithm**

An algorithm is developed to provide changes in the areal extent of snow (Kulkarni et. al., 2006). Snow extent is estimated at an interval of 5-days and 10-days, depending upon availabilities of AWiFS data. In 5-daily product, snow extent is generated scene-wise. In this product, snow and cloud extents are given. Estimate of cloud is important because, at times, snow is covered by cloud and this may be classified as non-snow area, leading to erroneous conclusions. In 10-daily product, three scenes are analyzed, if available. For example, 10 March product data of 5, 10 and 15 March was used. If any pixel is identified as snow on any one date then this pixel will be classified as snow on final product. This provides snow cover at an interval of 10 days, an important requirement in hydrological applications. Therefore, this product is generated basin-wise. Since this product is using three scenes, probability becomes high that at least in one scene, pixel may be cloud-free and this helps in overcoming problem associated with snow under cloud cover. If three consecutive scenes are not available, then all available scenes in 10 days window was used in the analysis. Differentiation between water and snow is difficult using NDSI image. In addition, separation of snow and water pixels is also difficult based on reflectance due to mountain shadow. Therefore, in the present algorithm, water bodies are marked in pre-winter season and are masked in the final products during winter. Flow diagram of the algorithm is given in Figure 2.



## **6. Results and discussions**

In this atlas, basin-wise snow cover statistics, maps, and seasonal depletion curves have been provided from October 2013 to June 2014. Snow ablation pattern varies from basin to basin, depending on area altitude distribution in the basins. In the month of October there was not much snow fall was observed, accumulation starts from November and melting was observed from till first week of December in all the three sub-basins. Again accumulation starts from second week of December till March end. Maximum snow cover was observed in the month of February in all the three sub-basins. Yamuna sub-basin ablation starts in early March. Fluctuation in snow cover was more in Yamuna sub-basin. It may be due to lower altitude.

## **Acknowledgements**

This investigation was carried out under Snow and Glacier Studies Project, a joint initiative of Ministry of Environment and Forest (MoEF) and Department of Space (DOS). The authors are grateful to Shri Tapan Mishra, Director, Space Applications Centre, Ahmedabad for continuous guidance and encouragement during the investigation. Authors would like to thank Dr. P. K. Pal, Deputy Director, EPSA, and Dr Manab Chakraborty Group Director, GSAG/EPASA, SAC for their suggestions and comments on the manuscript.

## **References**

Agarwal, K. G., Kumar, V. and T. Das, 1983, Melt runoff for a subcatchment of Beas basin. In Proceedings of the First National Symposium on Seasonal Snow Cover, New Delhi, India, April 28-30, 43 p.

Foster, J. L. and Chang, A. T. C., 1993, Snow cover, in Atlas of satellite observations related to global change. R. J. Gurney, C.L. Parkinson and J. L. Foster (eds.), Cambridge University Press, Cambridge, pp. 361-370.

Hall, D. K., Riggs, G. A. and Salomonson, V. V., 1995, Development of methods for mapping global snow cover using moderate resolution Image Spectroradiometer data. *Remote Sensing of Environment*, 54, pp. 127-140.

Kulkarni, A. V., Mathur, P., Rathore, B. P., Alex, S., Thakur N. and Kumar, M. 2002, Effect of global warming on snow ablation pattern in the Himalayas. *Current Science*, 83(2), pp 120-123.

Kulkarni A. V., Singh, S. K., Mathur, P. and Mishra, V. D., 2006, Algorithm to monitor snow cover using AWiFS data of RESOURCESAT for the Himalayan region. *International Journal of Remote Sensing*, 27(12), pp 2449-2457.

Kulkarni, A. V., Randhawa, S. S. and Sood, R. K., 1997, A stream flow simulation model in snow covered areas to estimate hydro-power potential: a case study of Malana nala, H.P. *Proc. of the First international Conference on Renewable Energy- Small Hydro*, Hyderabad, pp 761-770.

Markham, B. L. and Barker, J. L., 1987, Thematic Mapper bandpass solar exoatmospheric irradiances. *International Journal of Remote Sensing*, 8(3), pp 517-523.

Singer, F. S. and Popham, R. W., 1963. Non-meteorological observations from satellite. *Astronautics and Aerospace Engineering* 1(3), 89-92.

Srinivasulu, J. and Kulkarni, A. V., 2004, A satellite based spectral reflectance model for snow and glacier studies in the Himalayan terrain. *Proceedings of the Indian Academy of Science (Earth and Planetary Science)*, 113 (1), pp. 117-128.

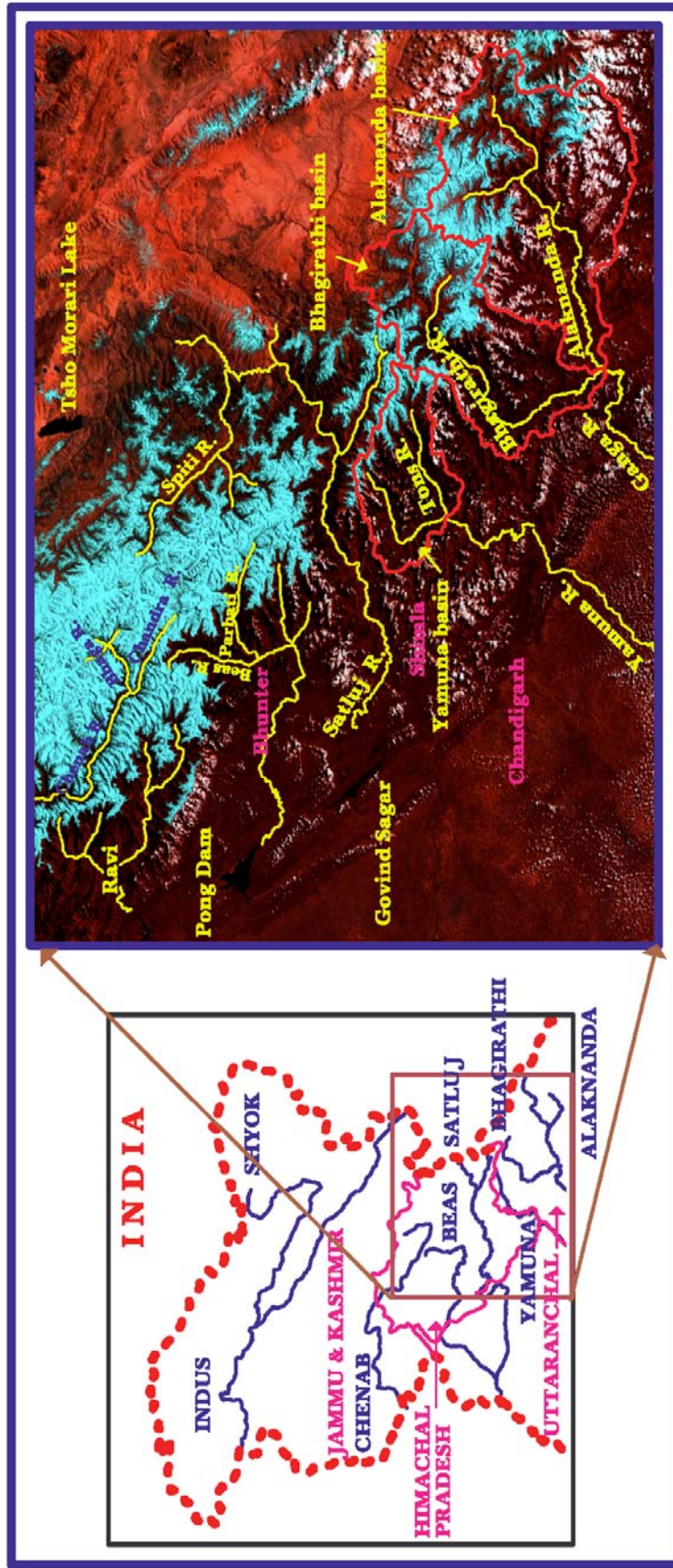


Figure 1: Location map of Alaknanda, Bhagirathi and Yamuna sub-basins (Part of Ganga basin)

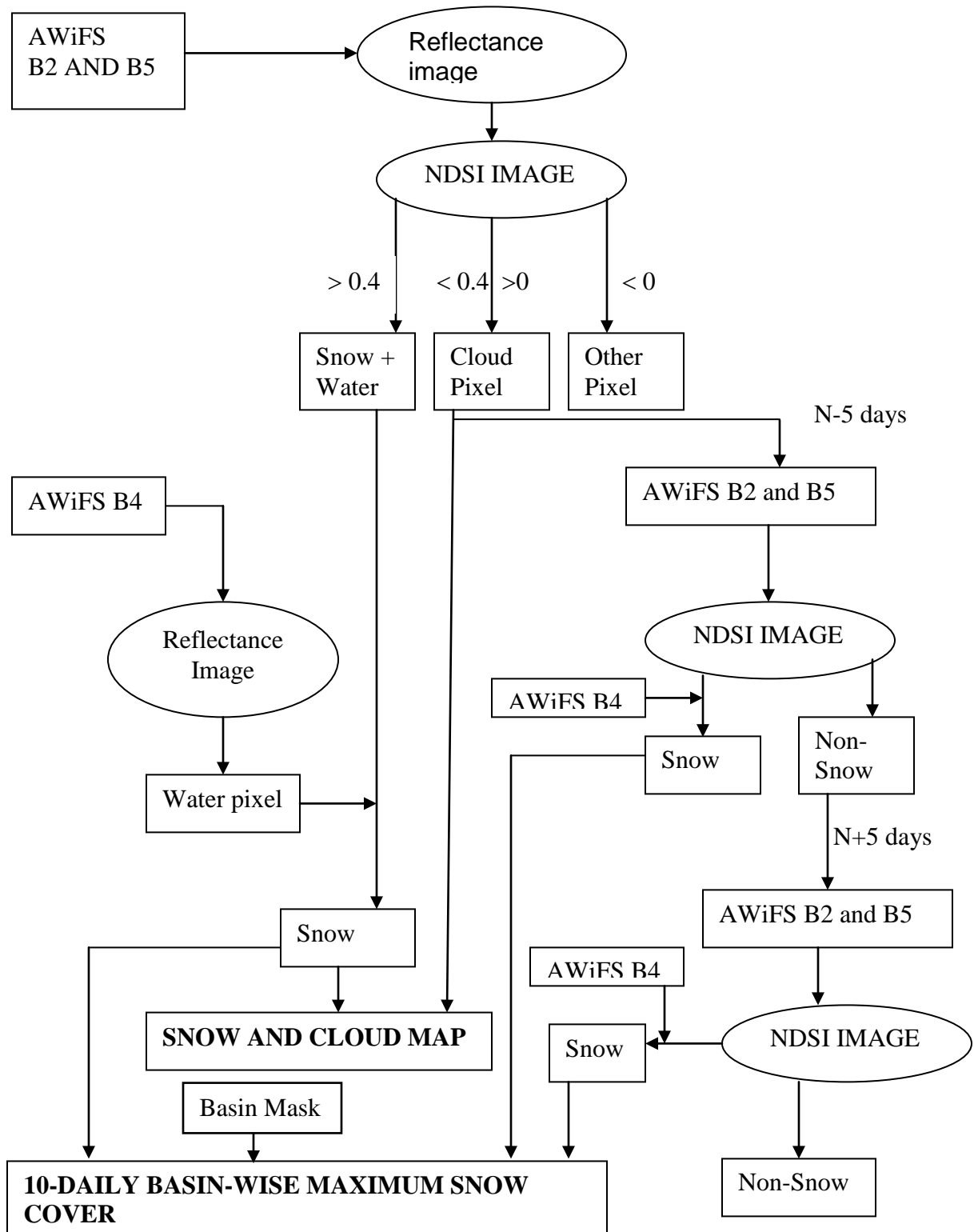


Figure 2: Algorithm for snow cover mapping using AWiFS data

*ALAKNANDA SUB-BASIN*

**AREAL EXTENT OF SNOW (5 DAILY)**

**BASIN NAME: ALAKNANDA**

**BASIN AREA: 11090 sq km**

S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
<b>October 2013</b>							
<b>1</b>	05-Oct-2013	2286	21	<b>5</b>	17-Oct-2013	1216	11
<b>2</b>	07-Oct-2013	1482	13	<b>6</b>	18-Oct-2013	1641	15
<b>3</b>	09-Oct-2013	1622	15	<b>7</b>	28-Oct-2013	2800	25
<b>4</b>	14-Oct-2013	2030	18	<b>8</b>	29-Oct-2013	1985	18
<b>November 2013</b>							
<b>9</b>	02-Nov-2013	2416	22	<b>13</b>	17-Nov-2013	4046	36
<b>10</b>	03-Nov-2013	3271	29	<b>14</b>	21-Nov-2013	3688	33
<b>11</b>	12-Nov-2013	4826	44	<b>15</b>	22-Nov-2013	3384	31
<b>12</b>	16-Nov-2013	3776	34	<b>16</b>	27-Nov-2013	2581	24
<b>December 2013</b>							
<b>17</b>	01-Dec-2013	2810	25	<b>22</b>	20-Dec-2010	3176	29
<b>18</b>	11-Dec-2013	2629	24	<b>23</b>	21-Dec-2013	2980	27
<b>19</b>	16-Dec-2013	2431	22	<b>24</b>	27-Dec-2013	1661	15
<b>20</b>	18-Dec-2013	1650	15	<b>25</b>	30-Dec-2013	3175	29
<b>21</b>	19-Dec-2013	3632	33				
<b>January 2014</b>							
<b>26</b>	01-Jan-2014	3368	31	<b>30</b>	20-Jan-2014	4549	41
<b>27</b>	02-Jan-2014	3649	33	<b>31</b>	23-Jan-2014	5881	53
<b>28</b>	04-Jan-2014	3378	30	<b>32</b>	28-Jan-2014	5256	47
<b>29</b>	16-Jan-2014	6673	60	<b>33</b>	30-Jan-2014	4860	44
<b>February 2014</b>							
<b>34</b>	02-Feb-2014	4915	44	<b>37</b>	21-Feb-2014	5916	53
<b>35</b>	16-Feb-2014	7683	69	<b>38</b>	25-Feb-2014	5710	51
<b>36</b>	18-Feb-2014	7683	69	<b>39</b>	26-Feb-2014	4955	45
<b>March 2014</b>							
<b>40</b>	07-Mar-2014	6096	55	<b>43</b>	22-Mar-2014	5444	49
<b>41</b>	12-Mar-2014	6360	57	<b>44</b>	31-Mar-2014	5267	47
<b>42</b>	15-Mar-2014	6085	55				
<b>April 2014</b>							
<b>45</b>	02-April-2014	4830	44	<b>51</b>	15-April-2014	5026	45
<b>46</b>	05-April-2014	5056	46	<b>52</b>	20-April-2014	4894	44

<b>47</b>	09-April-2014	5241	47	<b>53</b>	22-April-2014	4896	44
<b>48</b>	10-April-2014	5241	47	<b>54</b>	24-April-2014	4895	44
<b>49</b>	12-April-2014	4510	41	<b>55</b>	26-April-2014	4664	42
<b>50</b>	14-April-2014	5286	48				
<b>May 2014</b>							
<b>56</b>	01-May-2014	3247	29	<b>58</b>	18-May-2014	4537	29
<b>57</b>	09-May-2014	5231	47	<b>59</b>	28-May-2014	4071	37
<b>June 2014</b>							
<b>60</b>	02-June-2014	3878	35	<b>63</b>	16-June-2014	5017	45
<b>61</b>	11-June-2014	3270	29	<b>64</b>	25-June-2014	5225	47
<b>62</b>	13-June-2014	5018	45				

**AREAL EXTENT OF SNOW (10 DAILY)**

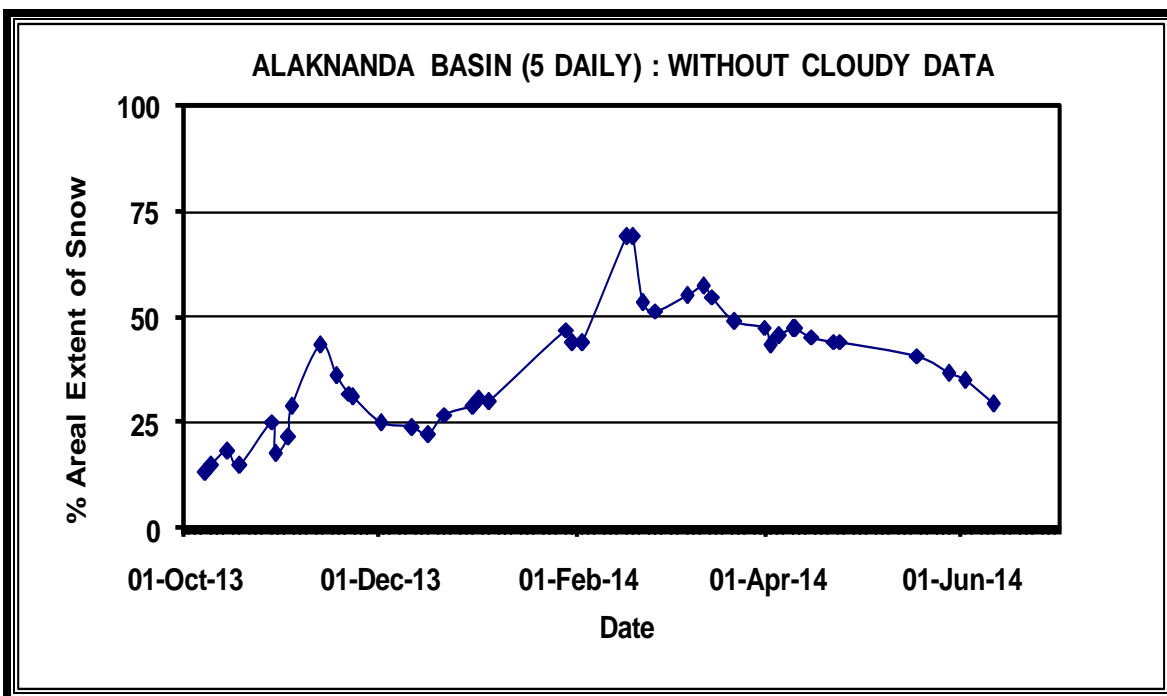
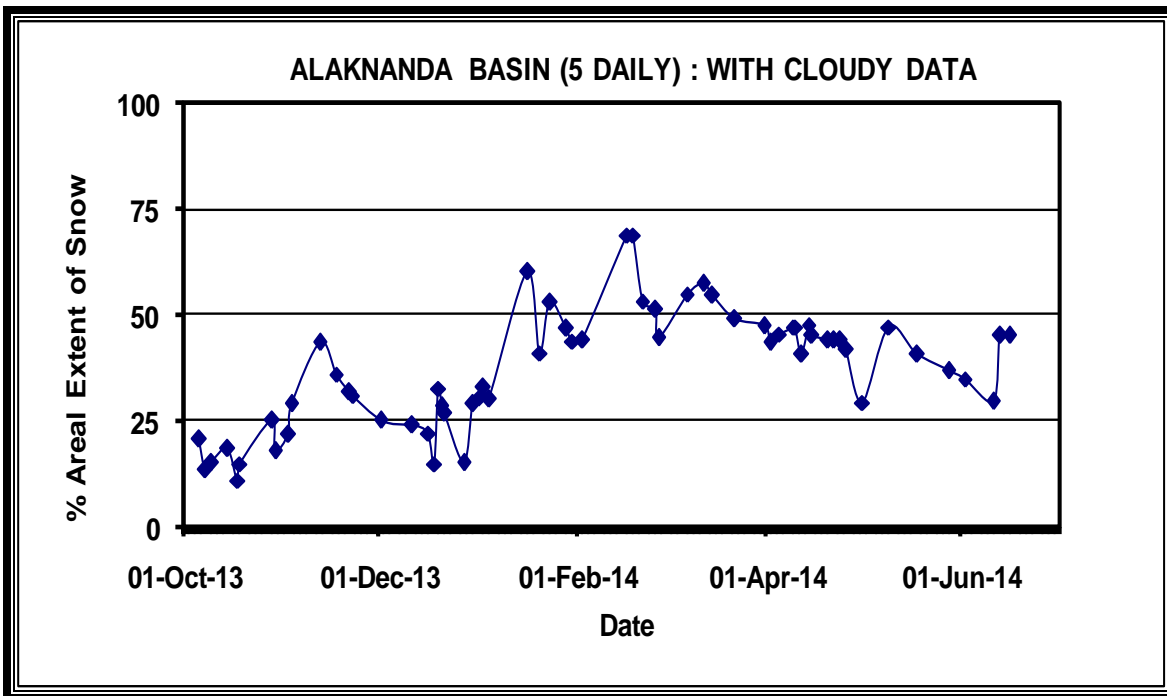
**BASIN NAME: ALAKNANDA**

**BASIN AREA: 11090 sq km**

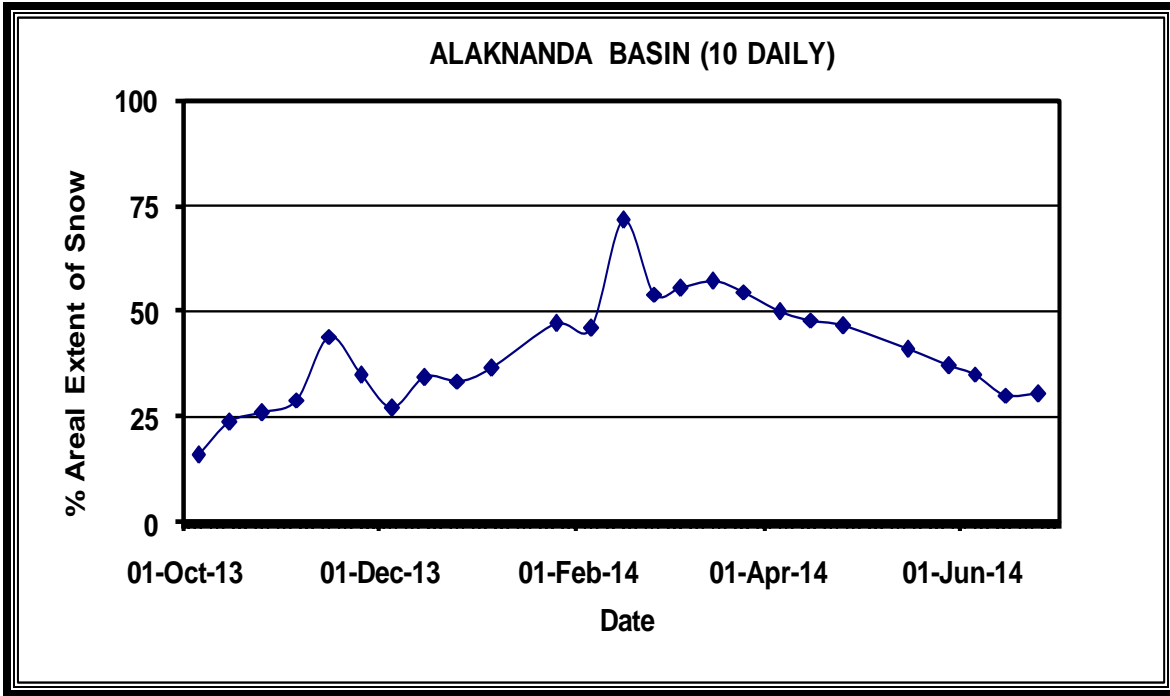
S. No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
<b>October 2013</b>							
<b>1</b>	05-Oct-2013	1774	16	<b>3</b>	25-Oct-2013	2883	26
<b>2</b>	15-Oct-2013	2631	24				
<b>November 2013</b>							
<b>4</b>	05-Nov-2013	3216	29	<b>6</b>	25-Nov-2013	3862	35
<b>5</b>	15-Nov-2013	4880	44				
<b>December 2013</b>							
<b>7</b>	05-Dec-2013	2994	27	<b>9</b>	25-Dec-2013	3703	33
<b>8</b>	15-Dec-2013	3812	34				
<b>January 2014</b>							
<b>10</b>	05-Jan-2014	4038	36	<b>11</b>	25-Jan-2014	5212	47
<b>February 2014</b>							
<b>12</b>	05-Feb-2014	5101	46	<b>14</b>	25-Feb-2014	5989	54
<b>13</b>	15-Feb-2014	7949	72				
<b>March 2014</b>							
<b>15</b>	05-Mar-2014	6134	55	<b>17</b>	25-Mar-2014	6049	55
<b>16</b>	15-Mar-2014	6321	57				
<b>April 2014</b>							
<b>18</b>	5-Apr-2014	5538	50	<b>20</b>	25-Apr-2014	5173	47
<b>19</b>	15-Apr-2014	5317	48				
<b>May 2014</b>							
<b>21</b>	15-May-14	4547	41	<b>22</b>	25-May-14	4103	37
<b>June 2014</b>							
<b>23</b>	05-June-14	3882	35	<b>25</b>	25-June-2014	3356	30
<b>24</b>	15-June-14	3327	30				



### Snow cover depletion curve

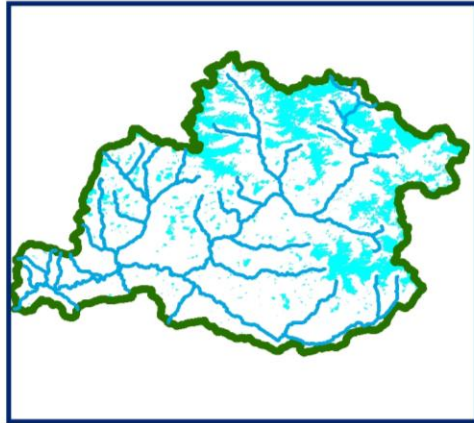


### Snow cover depletion curve

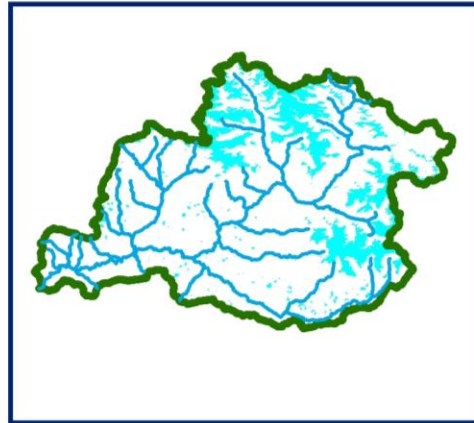


# *SNOW COVER MAP*

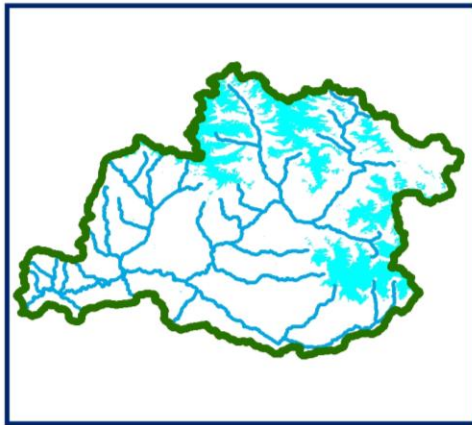
**SNOW COVER MAP : ALAKNANDA BASIN**



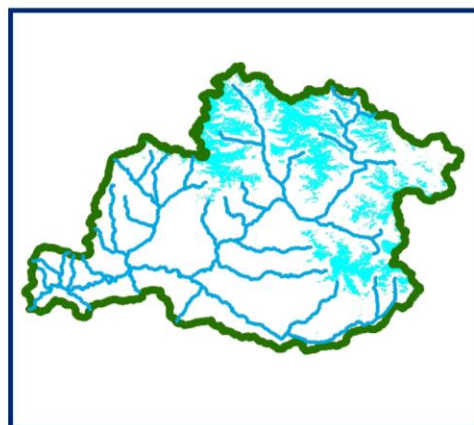
**05 OCTOBER 2013**



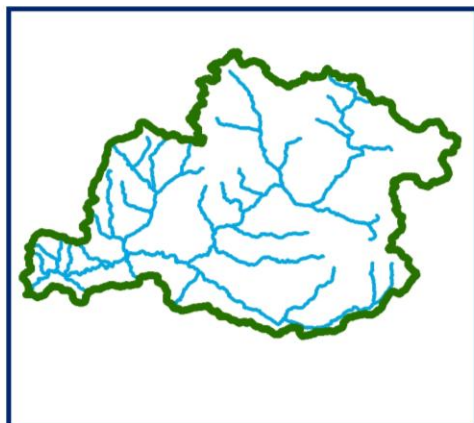
**09 OCTOBER 2013**



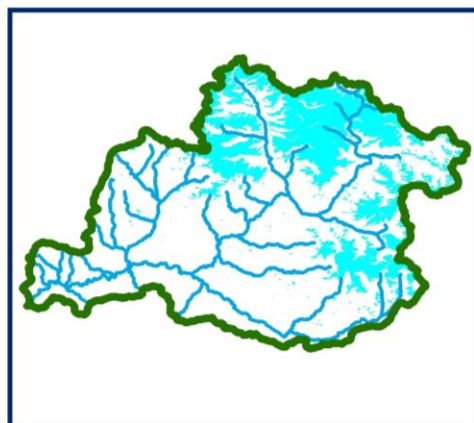
**14 OCTOBER 2013**



**18 OCTOBER 2013**



**DATA NOT AVAILABLE**



**28 OCTOBER 2013**



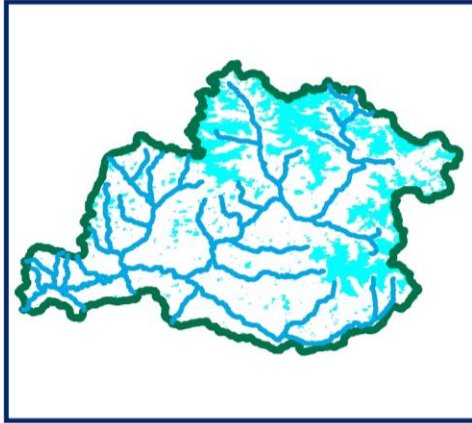
SNOW

0 20 40 80 120 160

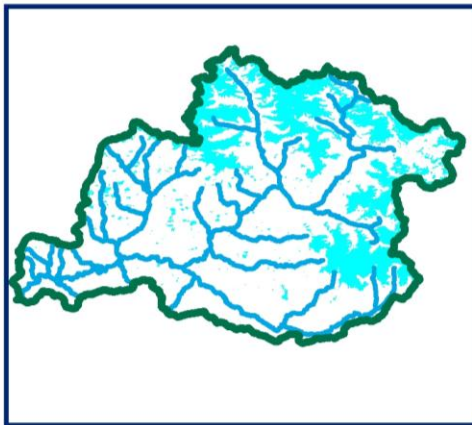


Kilometers

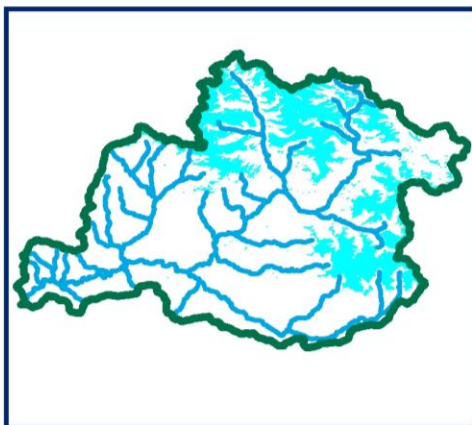
**10 DAILY SNOW COVER MAP: ALAKNANDA BASIN**



**DATA USED  
09 OCT 2013**



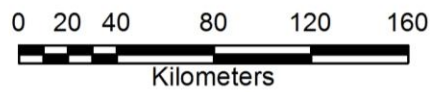
**DATA USED  
14 OCT 2013**



**DATA USED  
29 OCT 2013**



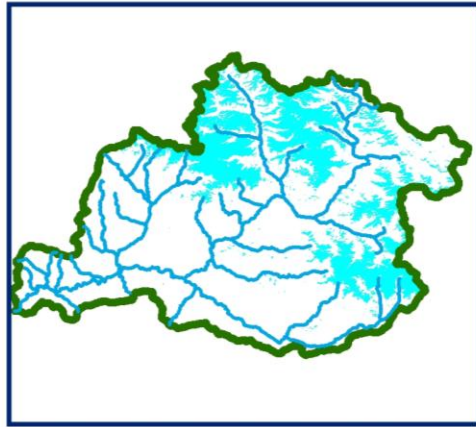
**SNOW**



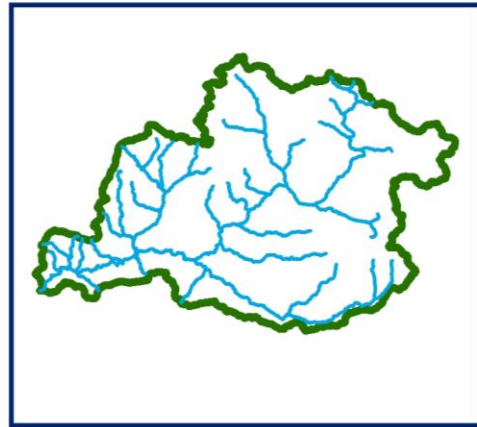
**SNOW COVER MAP**

:

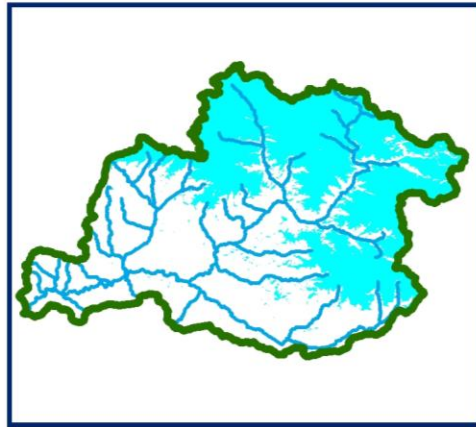
**ALAKNANDA BASIN**



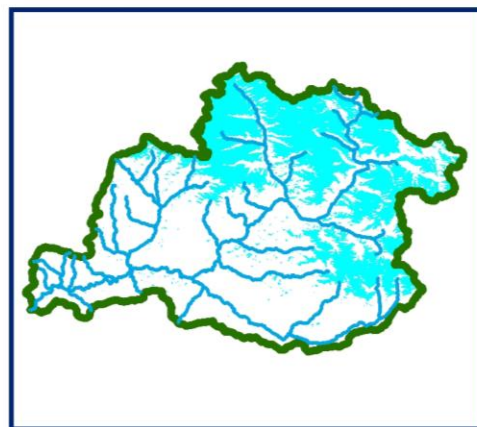
**02 NOVEMBER 2013**



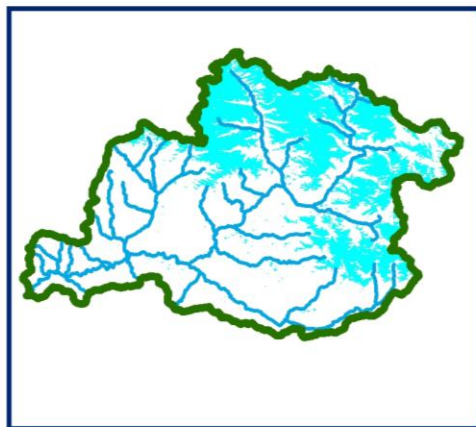
**DATA NOT AVAILABLE**



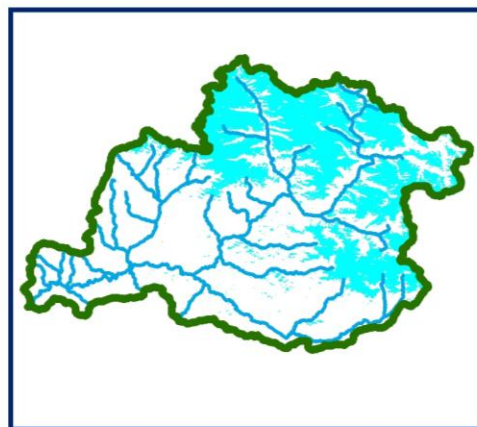
**12 NOVEMBER 2013**



**16 NOVEMBER 2013**



**21 NOVEMBER 2013**



**27 NOVEMBER 2013**



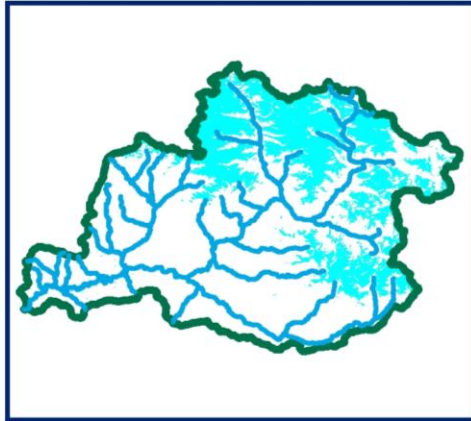
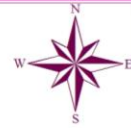
SNOW

0 20 40 80 120 160

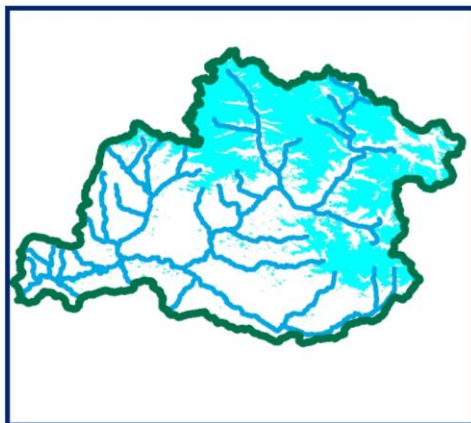


Kilometers

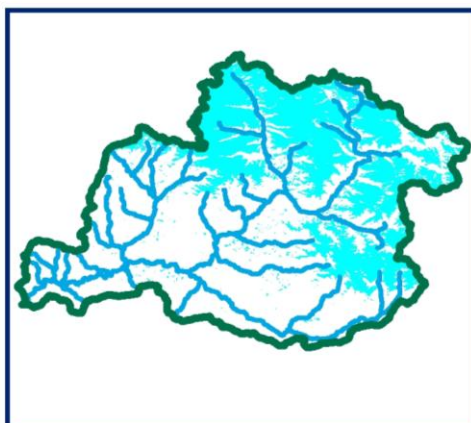
**10 DAILY SNOW COVER MAP: ALAKNANDA BASIN**



DATA USED  
**03 NOV 2013**



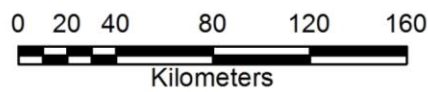
DATA USED  
**16 NOV 2013**



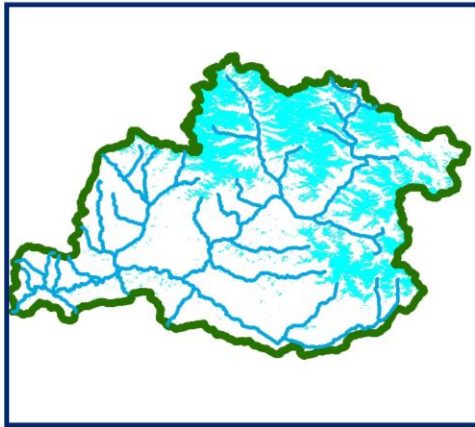
DATA USED  
**21 NOV 2013**



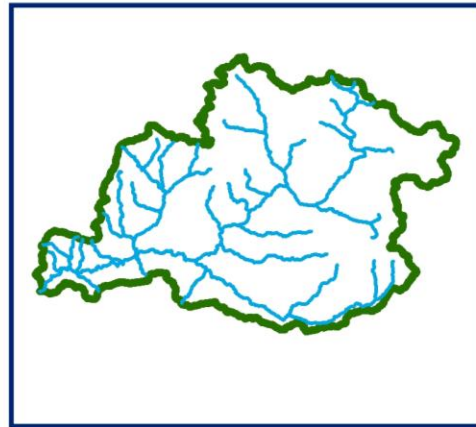
SNOW



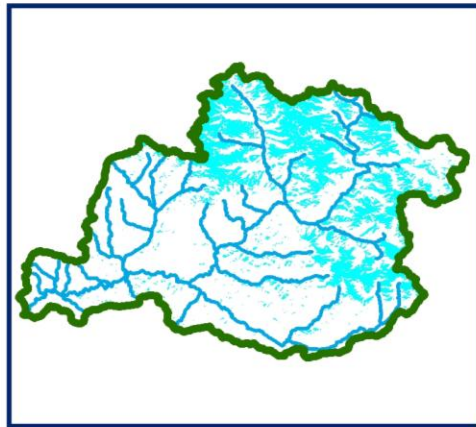
**SNOW COVER MAP : ALAKNANDA BASIN**



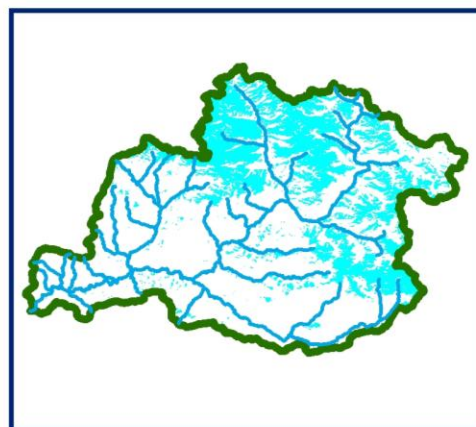
**01 DECEMBER 2013**



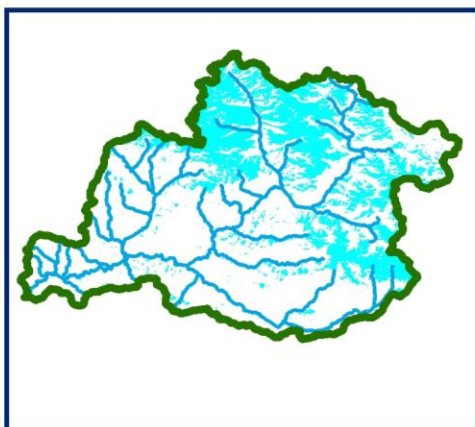
**DATA NOT AVAILABLE**



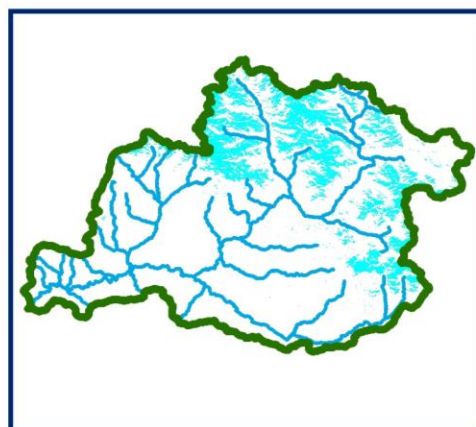
**11 DECEMBER 2013**



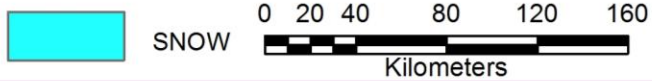
**20 DECEMBER 2013**



**21 DECEMBER 2013**

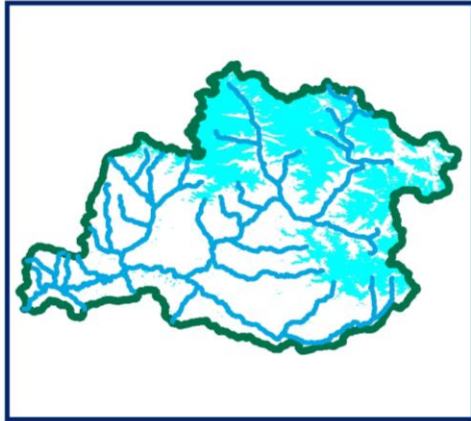


**27 DECEMBER 2013**





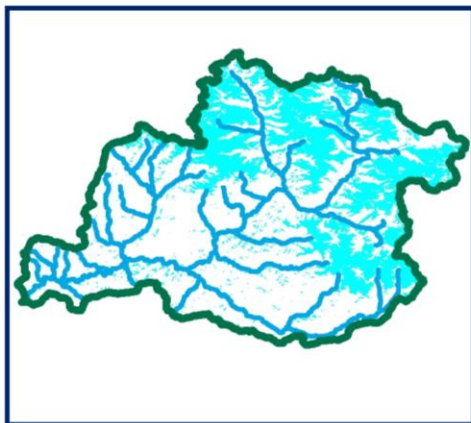
**10 DAILY SNOW COVER MAP: ALAKNANDA BASIN**



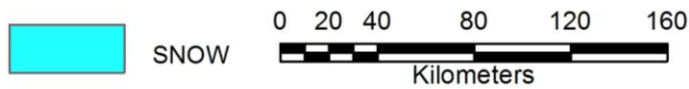
**DATA USED  
01 DEC 2013**



**DATA USED  
16 DEC 2013**

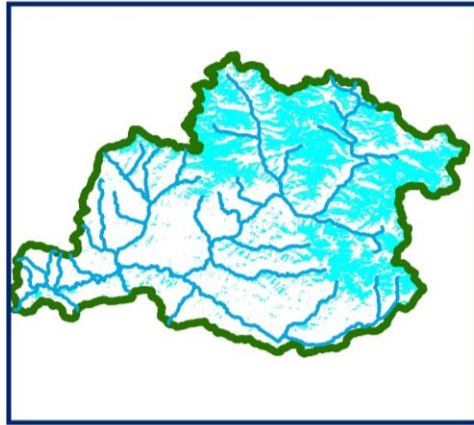


**DATA USED  
30 DEC 2013**

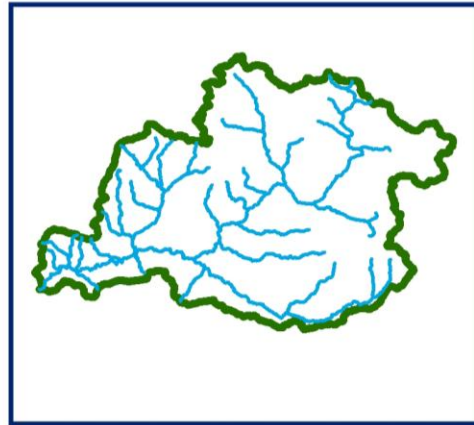


# SNOW COVER MAP

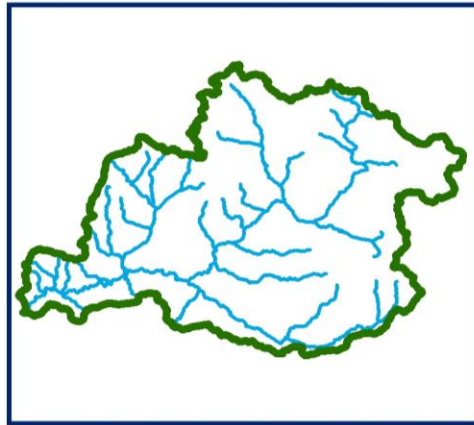
# : ALAKNANDA BASIN



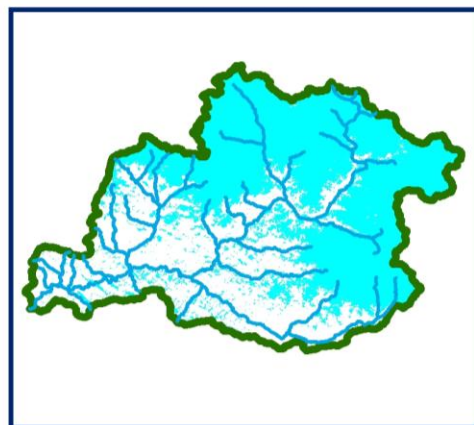
**02 JANUARY 2014**



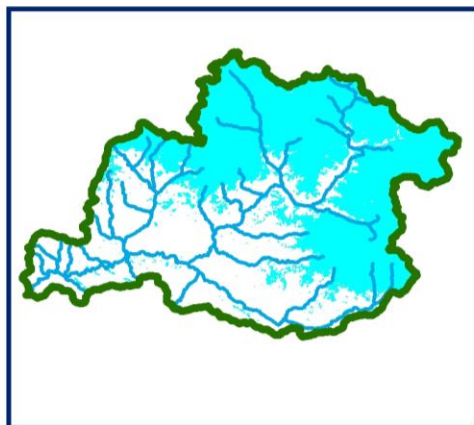
**DATA NOT AVAILABLE**



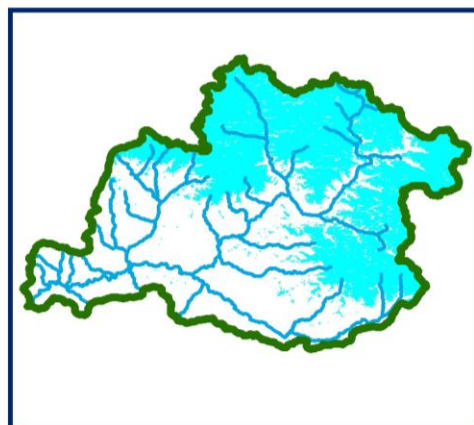
**DATA NOT AVAILABLE**



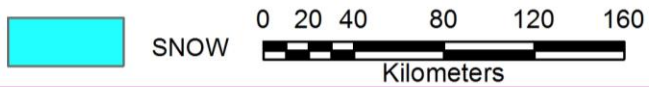
**16 JANUARY 2014**



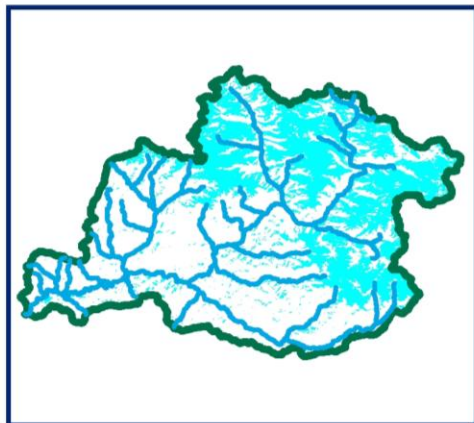
**23 JANUARY 2014**



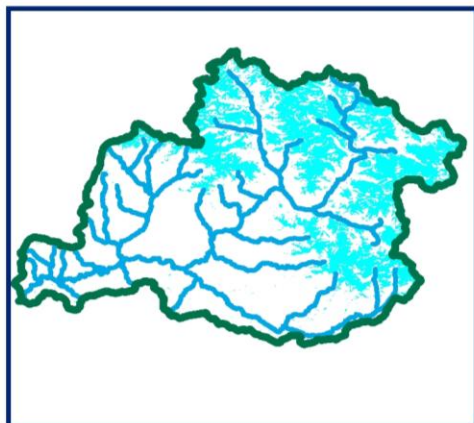
**30 JANUARY 2014**



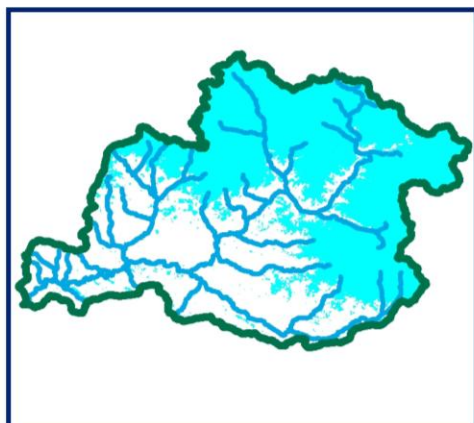
**10 DAILY SNOW COVER MAP: ALAKNANDA BASIN**



**DATA USED  
02 JAN 2014**



**DATA USED  
20 JAN 2014**



**DATA USED  
23 JAN 2014**

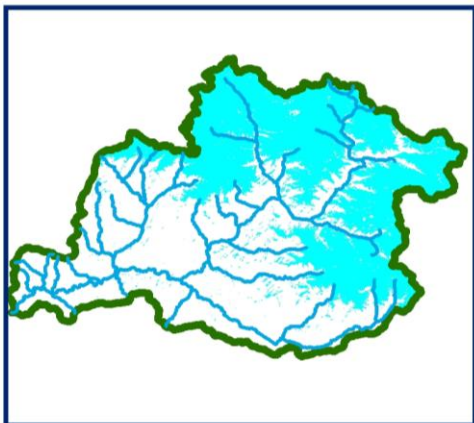


**SNOW**

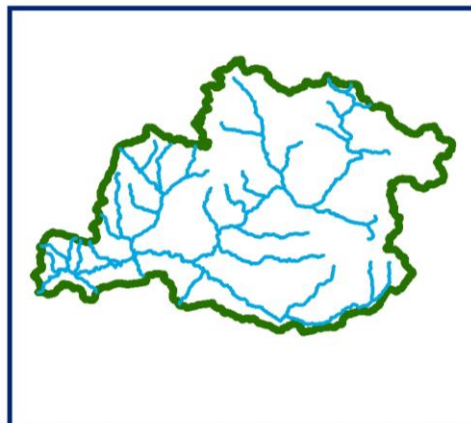


**SNOW COVER MAP**

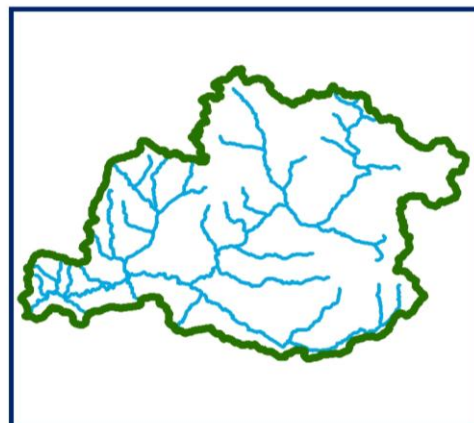
**: ALAKNANDA BASIN**



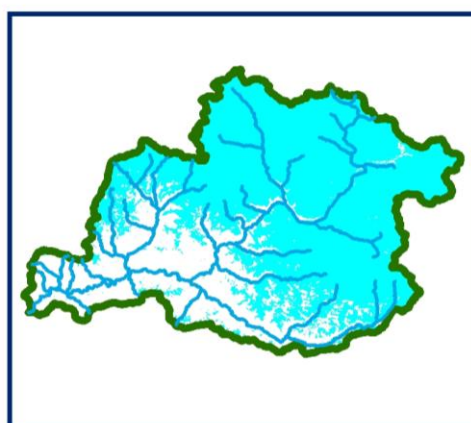
**02 FEBRUARY 2014**



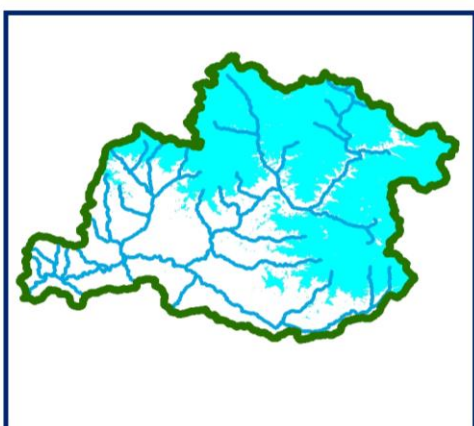
**DATA NOT AVAILABLE**



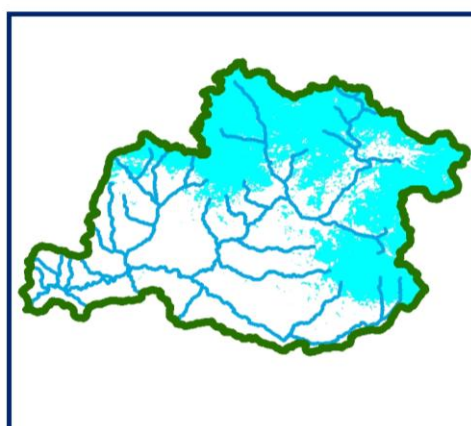
**DATA NOT AVAILABLE**



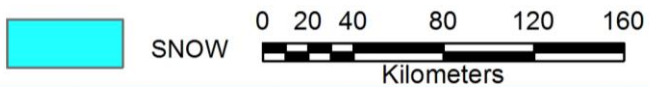
**18 FEBRUARY 2014**



**21 FEBRUARY 2014**



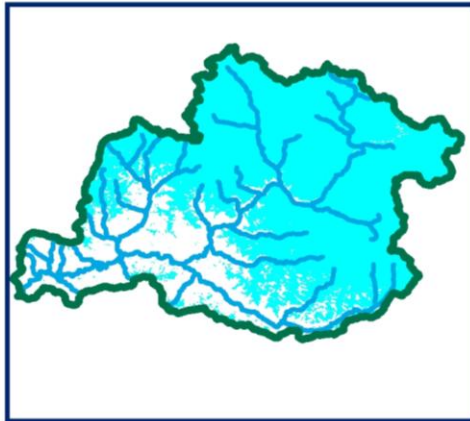
**26 FEBRUARY 2014**



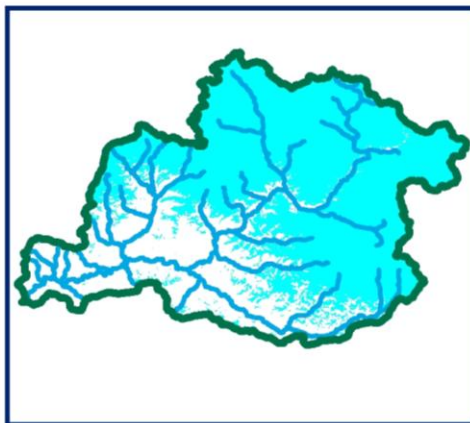
**10 DAILY SNOW COVER MAP: ALAKNANDA BASIN**



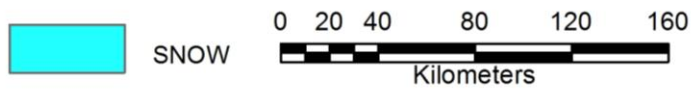
**DATA USED  
02 FEB 2014**



**DATA USED  
18 FEB 2014**

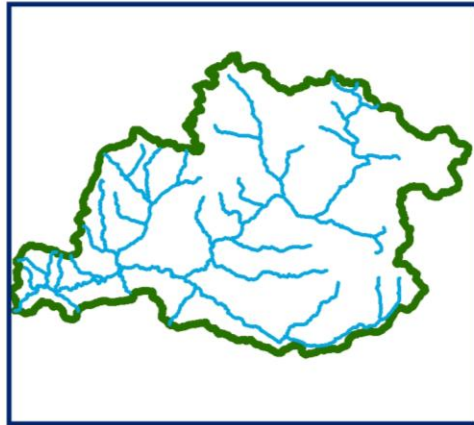


**DATA USED  
25 FEB 2014**

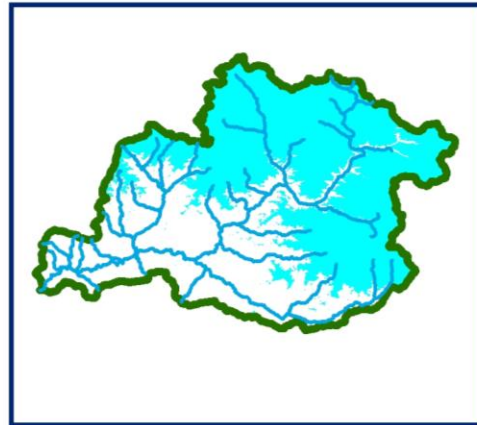


**SNOW COVER MAP**

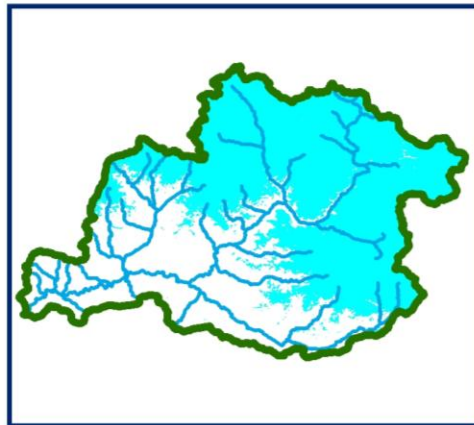
**: ALAKNANDA BASIN**



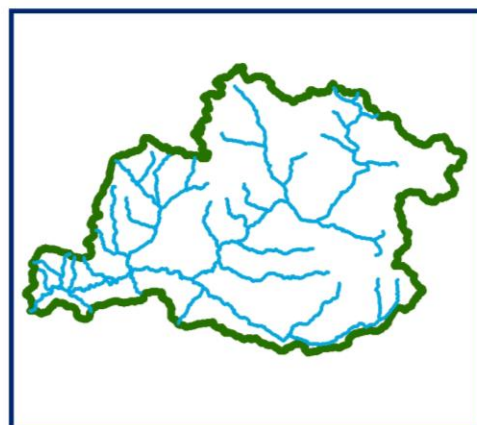
**DATA NOT AVAILABLE**



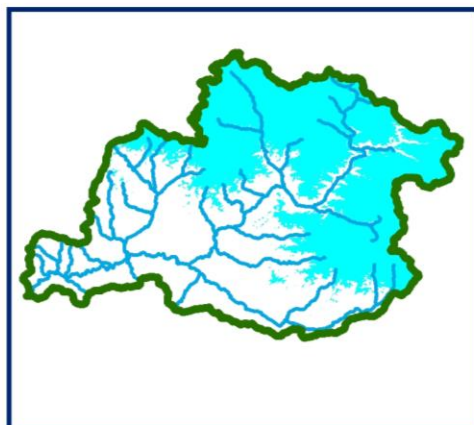
**07 MARCH 2014**



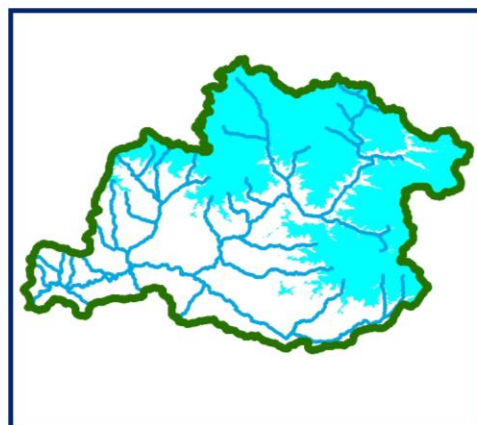
**12 MARCH 2014**



**DATA NOT AVAILABLE**



**22 MARCH 2014**



**31 MARCH 2014**



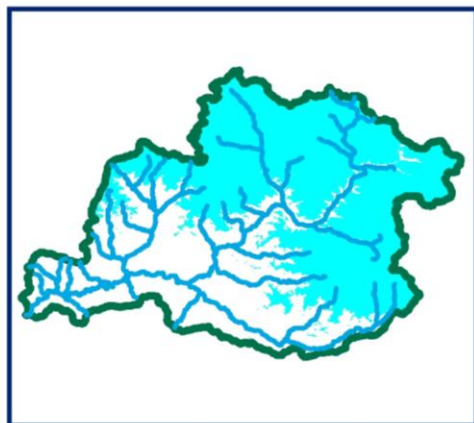
**SNOW**

0 20 40 80 120 160

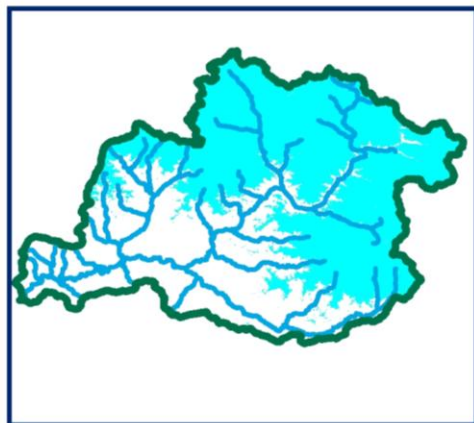


**Kilometers**

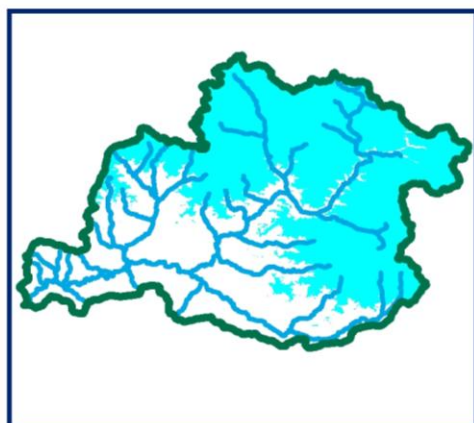
# 10 DAILY SNOW COVER MAP: ALAKNANDA BASIN



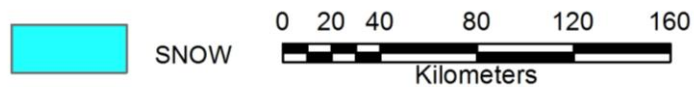
DATA USED  
07 MARCH 2014



DATA USED  
15 MARCH 2014



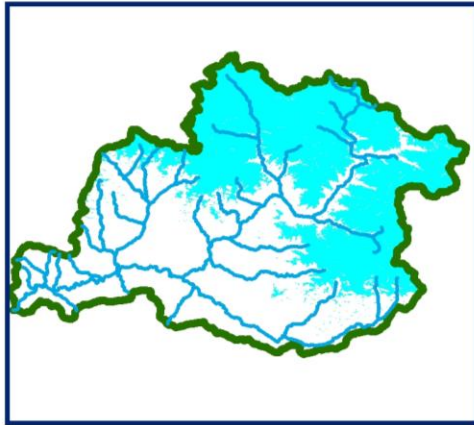
DATA USED  
22 MARCH 2014



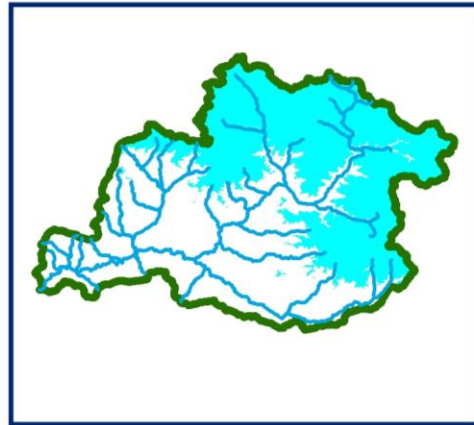
**SNOW COVER MAP**

**:**

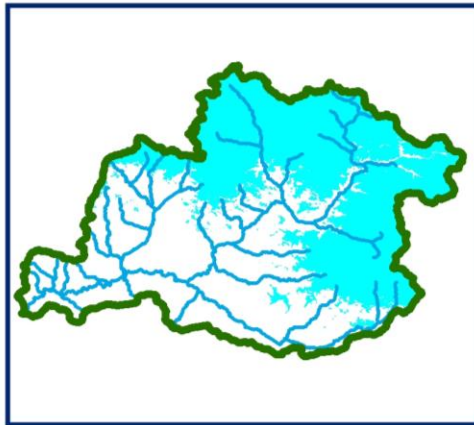
**ALAKNANDA BASIN**



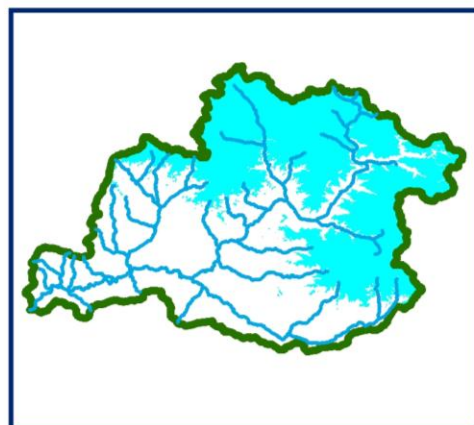
**02 APRIL 2014**



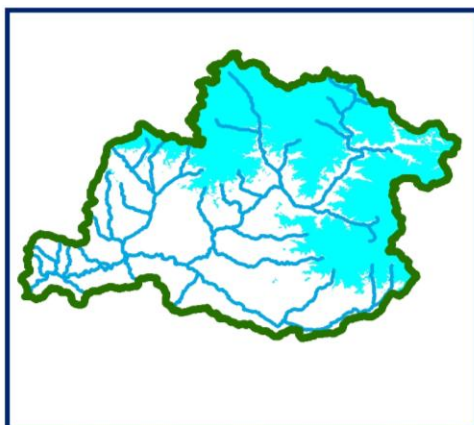
**09 APRIL 2014**



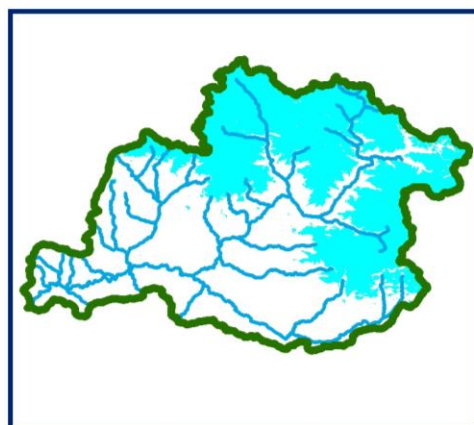
**14 APRIL 2014**



**20 APRIL 2014**



**22 APRIL 2014**



**26 APRIL 2014**



**SNOW**

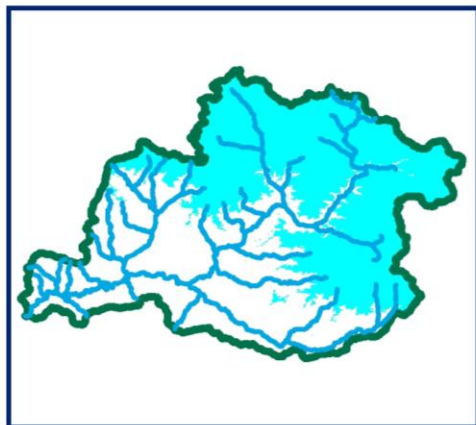
0 20 40 80 120 160



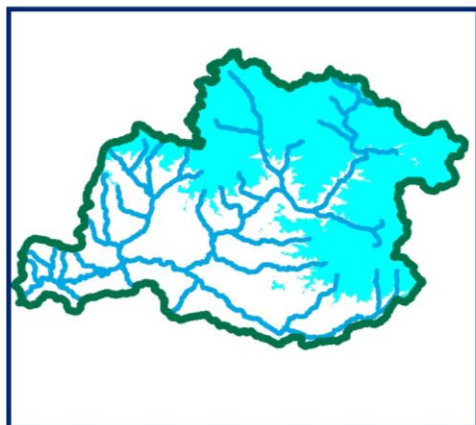
**Kilometers**



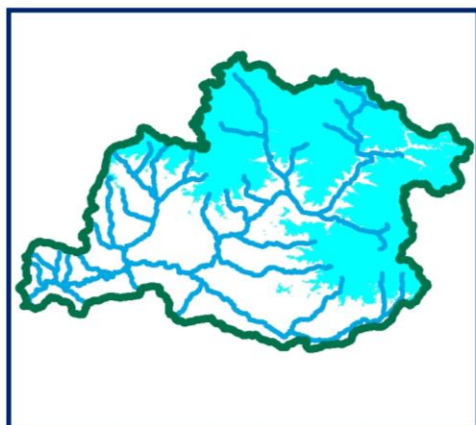
**10 DAILY SNOW COVER MAP: ALAKNANDA BASIN**



**DATA USED  
10 APRIL 2014**



**DATA USED  
15 APRIL 2014**



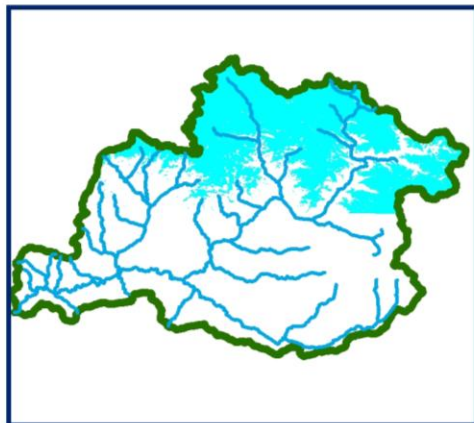
**DATA USED  
22 APRIL 2014**



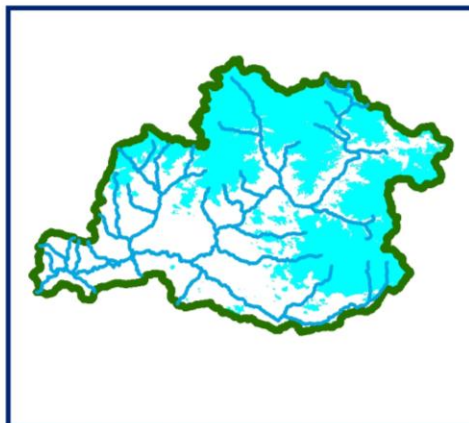
**SNOW**



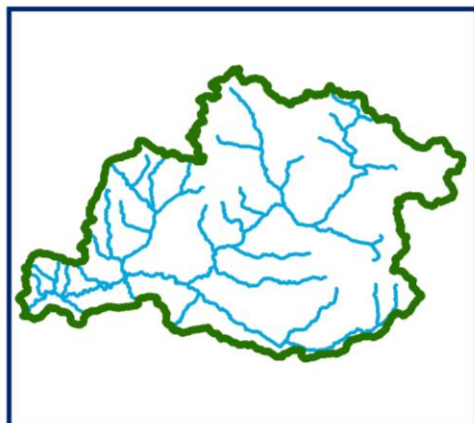
**SNOW COVER MAP : ALAKNANDA BASIN**



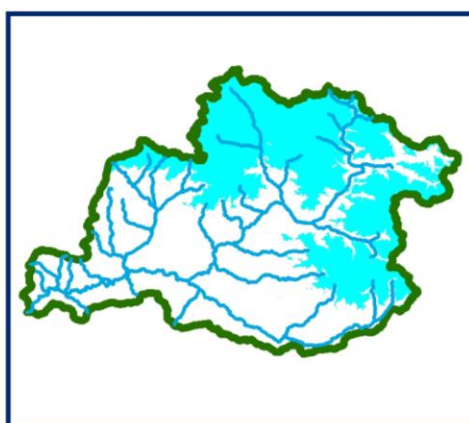
**01 MAY 2014**



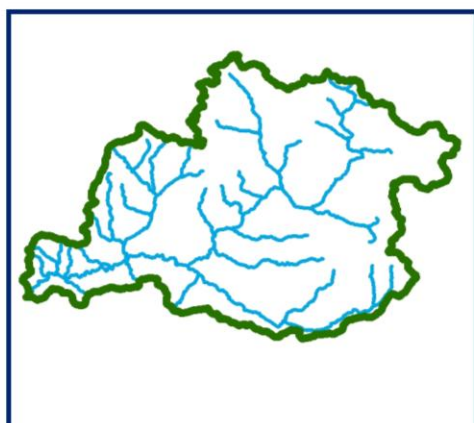
**09 MAY 2014**



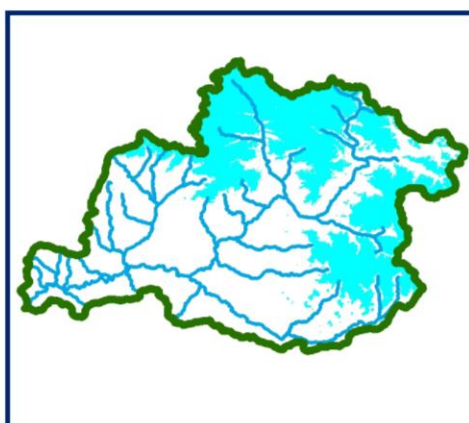
**DATA NOT AVAILABLE**



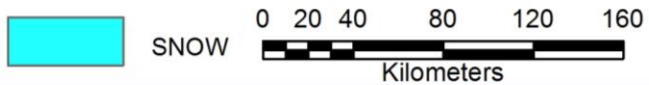
**18 MAY 2014**



**DATA NOT AVAILABLE**



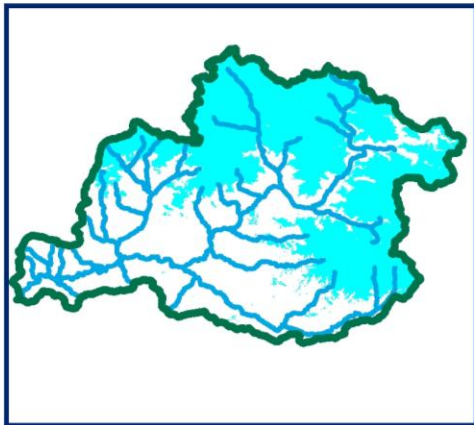
**28 MAY 2014**



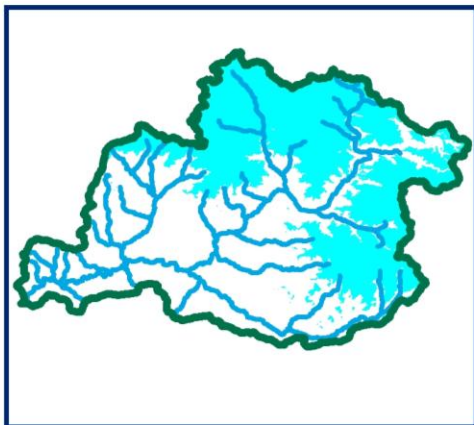
**10 DAILY SNOW COVER MAP: ALAKNANDA BASIN**



**DATA USED  
09 MAY 2014**



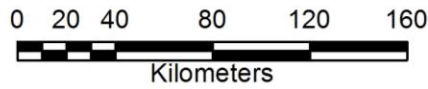
**DATA USED  
18 MAY 2014**



**DATA USED  
18 MAY 2014**

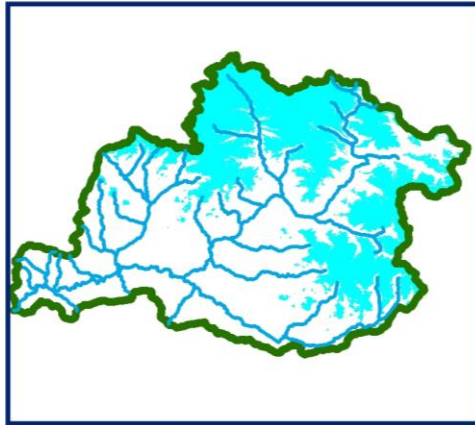


**SNOW**

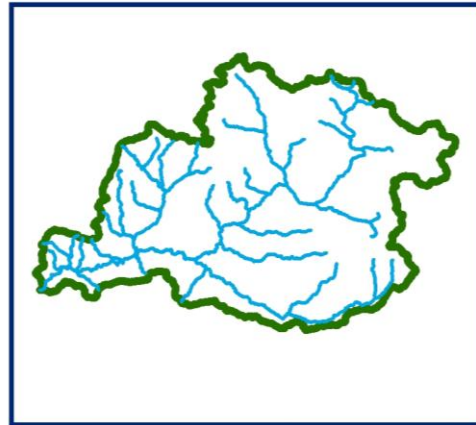


# SNOW COVER MAP

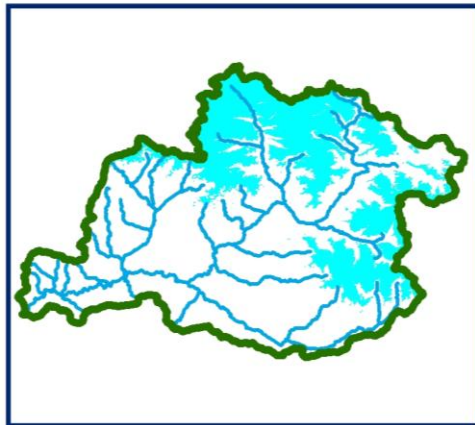
# : ALAKNANDA BASIN



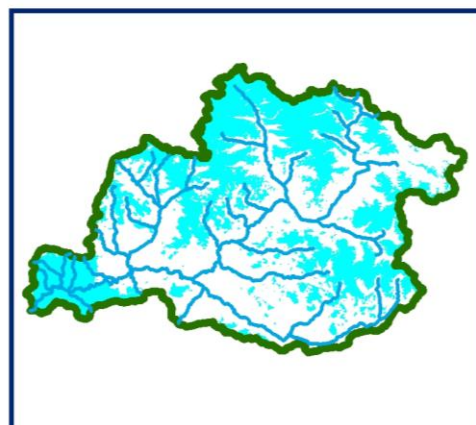
02 JUNE 2014



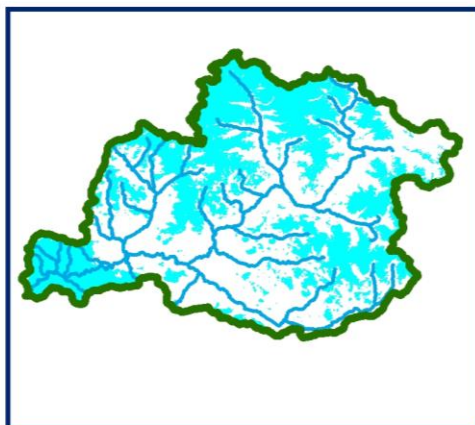
DATA NOT AVAILABLE



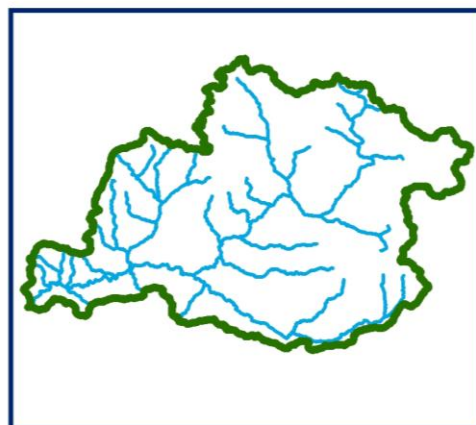
11 JUNE 2014



16 JUNE 2014



25 JUNE 2014



DATA NOT AVILABLE

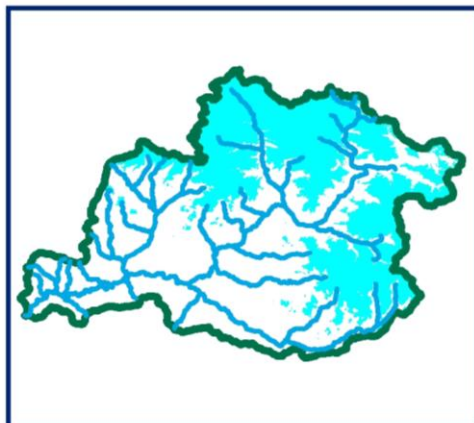


SNOW

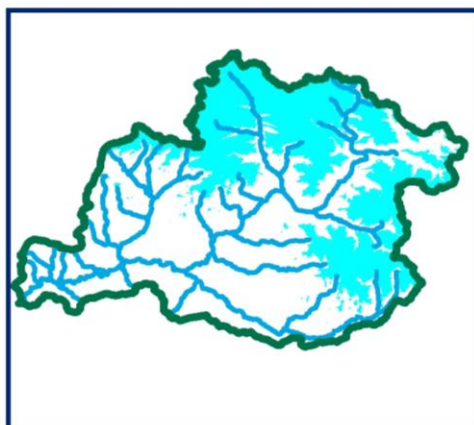


Kilometers

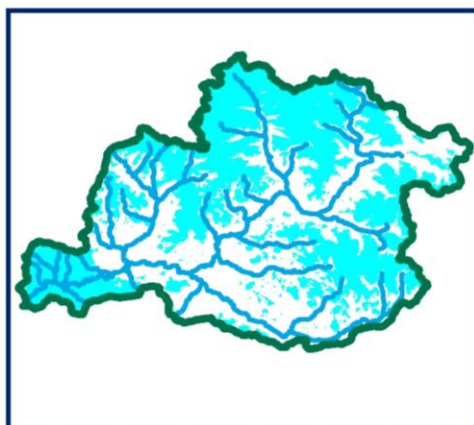
# 10 DAILY SNOW COVER MAP: ALAKNANDA BASIN



DATA USED  
**02 JUNE 2014**



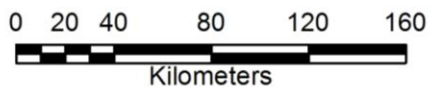
DATA USED  
**11 JUNE 2014**



DATA USED  
**25 JUNE 2014**



SNOW



# *BHAGIRATHI SUB-BASIN*

**AREAL EXTENT OF SNOW (5 DAILY)**

**BASIN NAME: BHAGIRATHI**

**BASIN AREA: 7438 sq km**

S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
<b>October 2013</b>							
<b>1</b>	04-Oct-13	1312	18	<b>7</b>	18-Oct-13	824	11
<b>2</b>	05-Oct-13	1594	21	<b>8</b>	21-Oct-13	995	13
<b>3</b>	07-Oct-13	1063	14	<b>9</b>	27-Oct-13	912	12
<b>4</b>	09-Oct-13	1452	17	<b>10</b>	28-Oct-13	1803	24
<b>5</b>	14-Oct-13	4460	60	<b>11</b>	29-Oct-13	1289	17
<b>6</b>	17-Oct-13	1006	14				
<b>November 2013</b>							
<b>12</b>	02-Nov-13	1341	18	<b>15</b>	17-Nov-13	3225	43
<b>13</b>	12-Nov-13	3243	44	<b>16</b>	21-Nov-13	2760	37
<b>14</b>	16-Nov-13	3282	44	<b>17</b>	22-Nov-13	2706	36
<b>December 2013</b>							
<b>18</b>	01-Dec-13	2448	33	<b>23</b>	19-Dec-13	2358	32
<b>19</b>	10-Dec-13	2150	29	<b>24</b>	25-Dec-13	2087	28
<b>20</b>	11-Dec-13	1928	26	<b>25</b>	27-Dec-13	913	12
<b>21</b>	15-Dec-13	1799	24	<b>26</b>	30-Dec-13	2031	27
<b>22</b>	16-Dec-13	1915	26				
<b>January 2014</b>							
<b>27</b>	1-Jan-14	1699	23	<b>31</b>	23-Jan-14	4092	55
<b>28</b>	11-Jan-14	2957	40	<b>32</b>	28-Jan-14	4057	55
<b>29</b>	16-Jan-14	3163	43	<b>33</b>	30-Jan-14	3248	44
<b>30</b>	20-Jan-14	3262	44				
<b>February 2014</b>							
<b>34</b>	02-Feb-14	3688	50	<b>37</b>	21-Feb-14	4420	59
<b>35</b>	16-Feb-14	5579	75	<b>38</b>	25-Feb-14	4521	61
<b>36</b>	18-Feb-14	4184	56	<b>39</b>	26-Feb-14	4277	58
<b>March 2014</b>							
<b>40</b>	07-Mar-14	4208	57	<b>43</b>	22-Mar-14	4122	55
<b>41</b>	12-Mar-14	4525	61	<b>44</b>	31-Mar-14	3976	53
<b>42</b>	16-Mar-14	4463	60				
<b>April 2014</b>							
<b>45</b>	02-Apr-14	3687	50	<b>51</b>	15-Apr-14	4016	54

<b>46</b>	05-Apr-14	3879	52	<b>52</b>	22-Apr-14	3719	50
<b>47</b>	09-Apr-14	4037	54	<b>53</b>	24-Apr-14	3774	50
<b>48</b>	10-Apr-14	3830	51	<b>54</b>	26-Apr-14	3637	49
<b>49</b>	12-Apr-14	3820	51	<b>55</b>	28-Apr-14	988	13
<b>50</b>	14-Apr-14		56				
<b>May 2014</b>							
<b>56</b>	01-May-14	3350	45	<b>61</b>	20-May-14	3363	45
<b>57</b>	03-May-14	4668	63	<b>62</b>	21-May-14	3093	42
<b>58</b>	04-May-14	5263	71	<b>63</b>	25-May-14	3504	47
<b>59</b>	16-May-14	3505	47	<b>64</b>	28-May-14	3150	42
<b>60</b>	18-May-14	3666	49				
<b>June 2014</b>							
<b>65</b>	02-Jun-14		39	<b>70</b>	16-Jun-14	4124	54
<b>66</b>	04-Jun-14	2675	36	<b>71</b>	25-Jun-14	2398	32
<b>67</b>	09-Jun-14	2380	32	<b>72</b>	28-Jun-14	1961	26
<b>68</b>	13-Jun-14	2176	29	<b>73</b>			
<b>69</b>	14-Jun-14	2132	29	<b>74</b>			



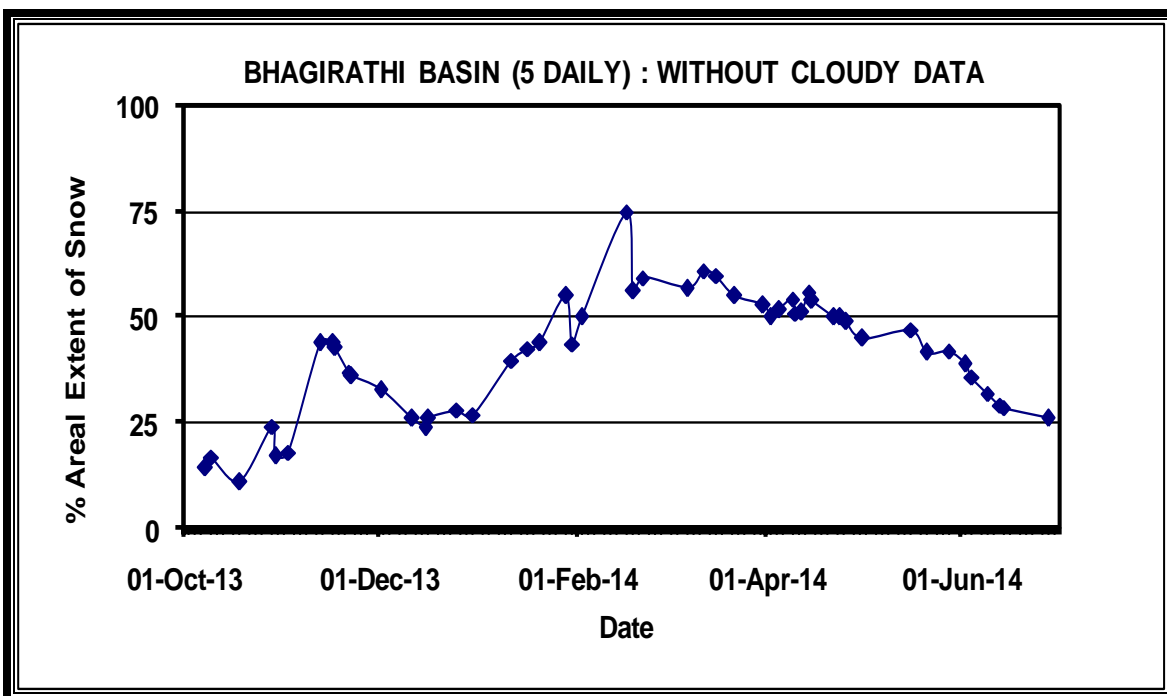
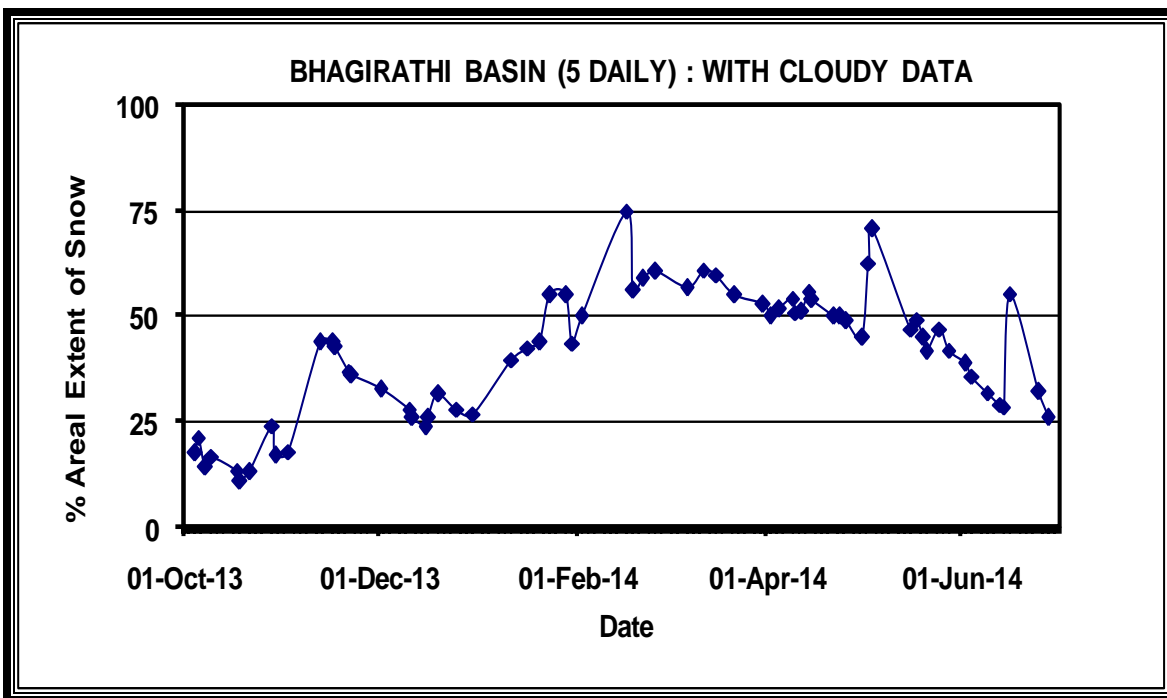
**AREAL EXTENT OF SNOW (10 DAILY)**

**BASIN NAME: BHAGIRATHI**

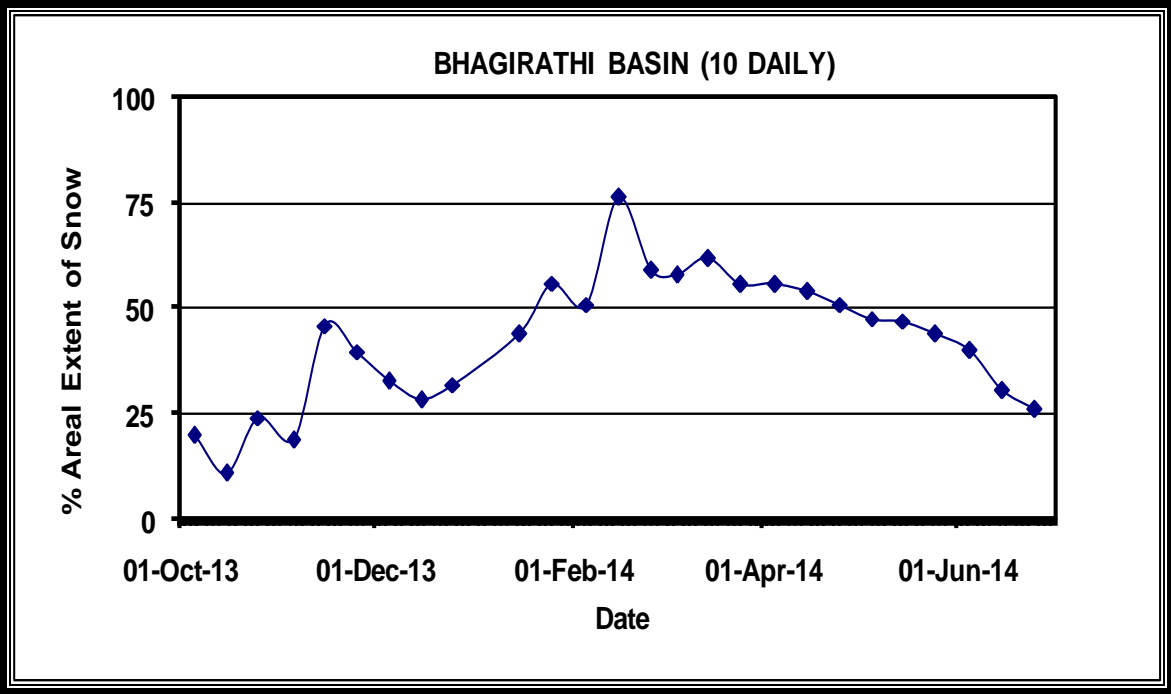
**BASIN AREA: 7438 sq km**

S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
<b>October 2013</b>				<b>November 2013</b>			
<b>1</b>	05-Oct-13	1488	20	<b>4</b>	05-Nov-13	1413	19
<b>2</b>	15-Oct-13	818	11	<b>5</b>	15-Nov-13	3421	46
<b>3</b>	25-Oct-13	1803	24	<b>6</b>	25-Nov-13	2960	40
<b>December 2013</b>				<b>January 2014</b>			
<b>7</b>	05-Dec-13	2455	33	<b>10</b>	15-Jan-14	3273	44
<b>8</b>	15-Dec-13	2108	28	<b>11</b>	25-Jan-14	4165	56
<b>9</b>	25-Dec-13	2380	32				
<b>February 2014</b>				<b>March 2014</b>			
<b>12</b>	05-Feb-14	3793	51	<b>15</b>	05-Mar-14	4314	58
<b>13</b>	15-Feb-14	5692	77	<b>16</b>	15-Mar-14	4612	62
<b>14</b>	25-Feb-14	4388	59	<b>17</b>	25-Mar-14	4146	56
<b>April 2014</b>				<b>May 2014</b>			
<b>18</b>	05-Apr-14	4158	56	<b>21</b>	05-May-14	3537	48
<b>19</b>	15-Apr-14	4017	54	<b>22</b>	15-May-14	3496	47
<b>20</b>	25-Apr-14	3793	51	<b>23</b>	25-May-14	3273	44
<b>June 2014</b>							
<b>24</b>	05-Jun-2014	2975	40				
<b>25</b>	15-Jun-2014	2289	31				
<b>26</b>	25-Jun-2014	1934	26				

### Snow cover depletion curve

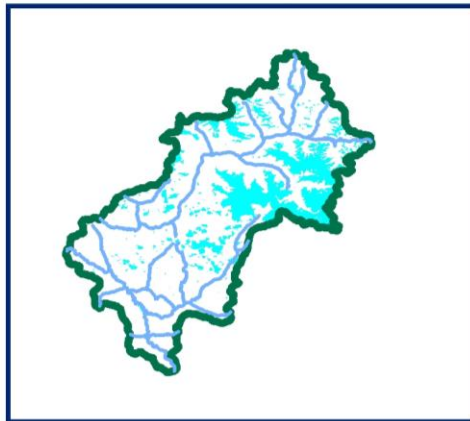


# Snow cover depletion curve

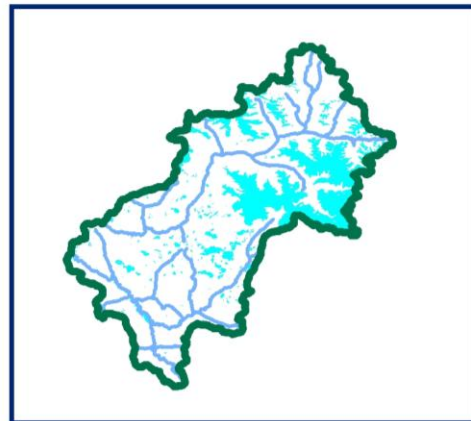


# *SNOW COVER MAP*

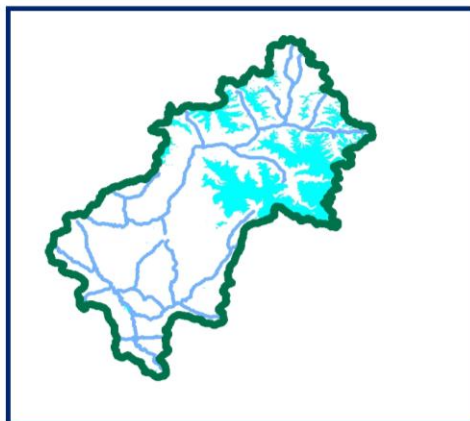
# SNOW COVER MAP : BHAGIRATHI BASIN



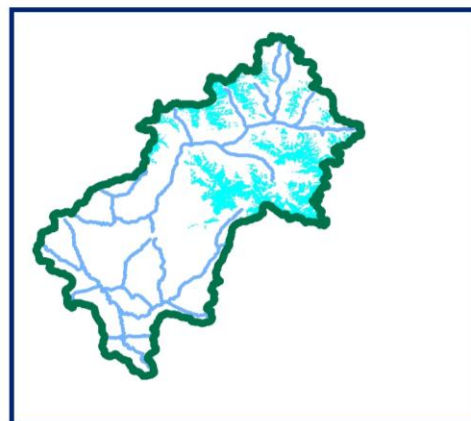
05 OCT 2013



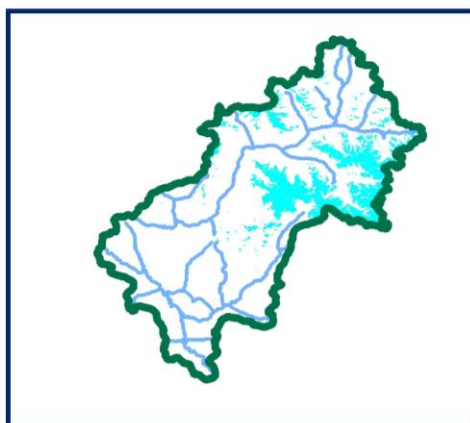
09 OCT 2013



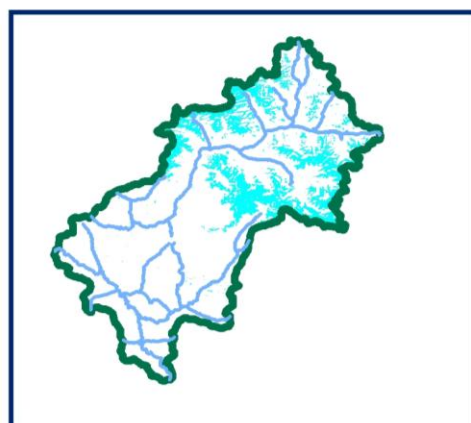
14 OCT 2013



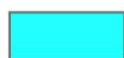
18 OCT 2013



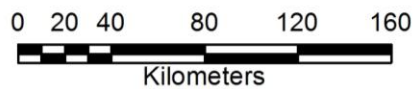
21 OCT 2013



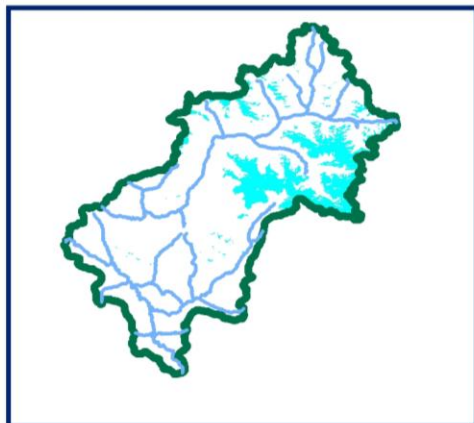
27 OCT 2013



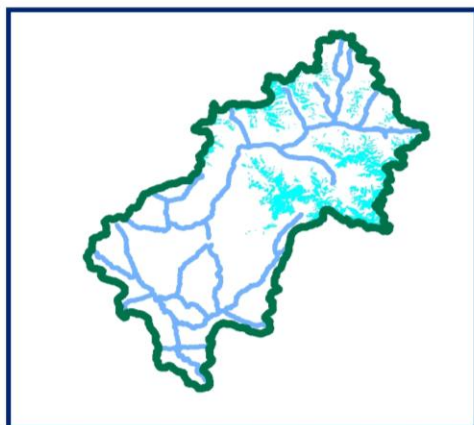
SNOW



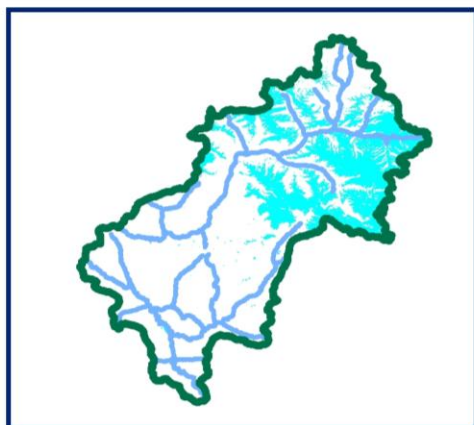
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**07 OCTOBER 2013**



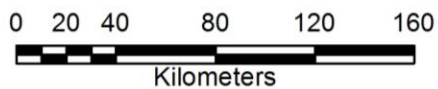
DATA USED  
**18 OCTOBER 2013**



DATA USED  
**28 OCTOBER 2013**



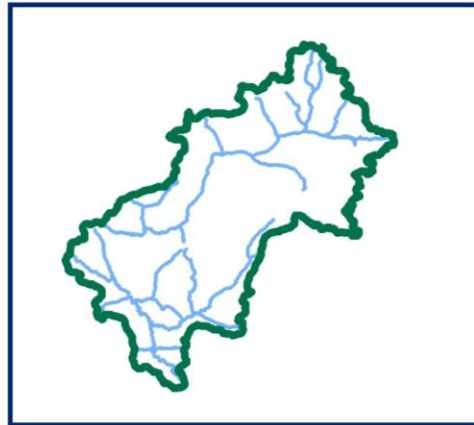
SNOW



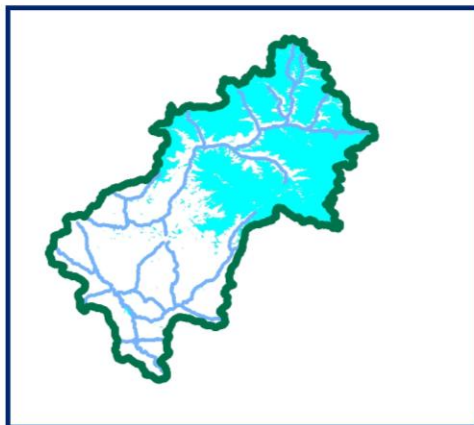
**SNOW COVER MAP : BHAGIRATHI BASIN**



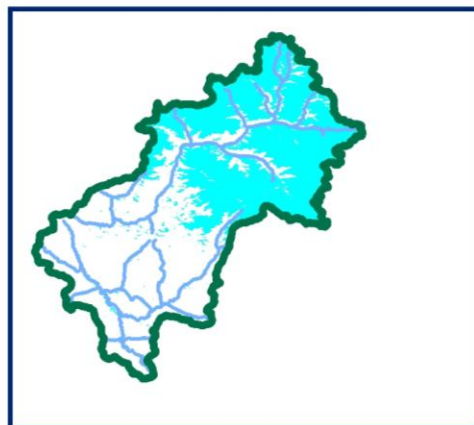
**02 NOVEMBER 2013**



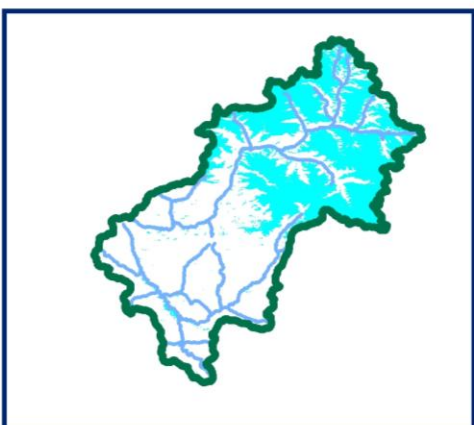
**DATA NOT AVAILABLE**



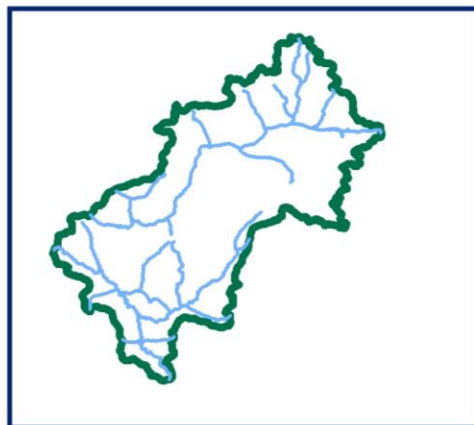
**12 NOVEMBER 2013**



**16 NOVEMBER 2013**



**21 NOVEMBER 2013**



**DATA NOT AVAILABLE**



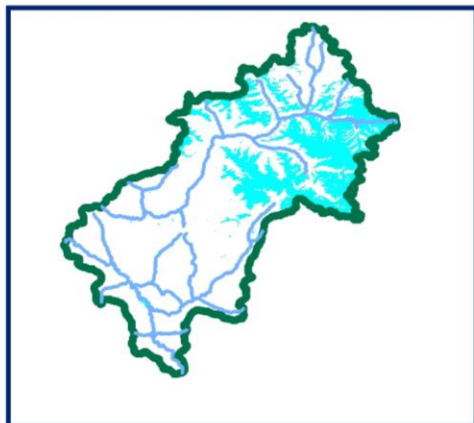
**SNOW**

0 20 40 80 120 160

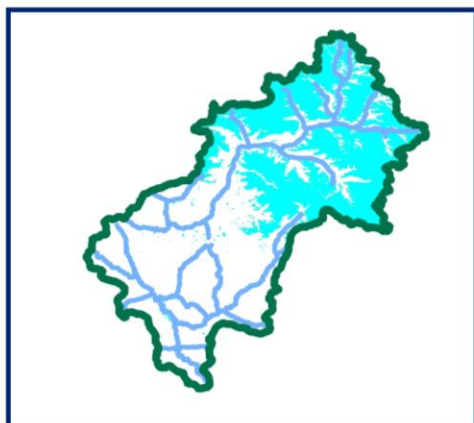


Kilometers

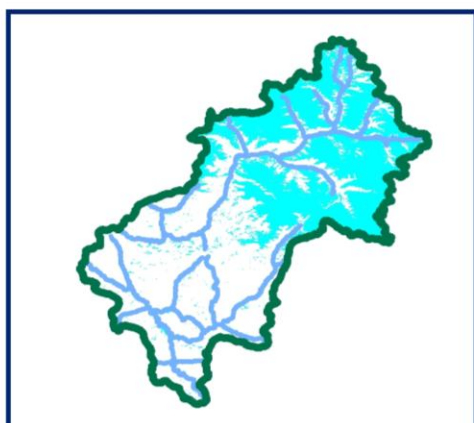
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**02 NOVEMBER 2013**



DATA USED  
**16 NOVEMBER 2013**



DATA USED  
**22 NOVEMBER 2013**

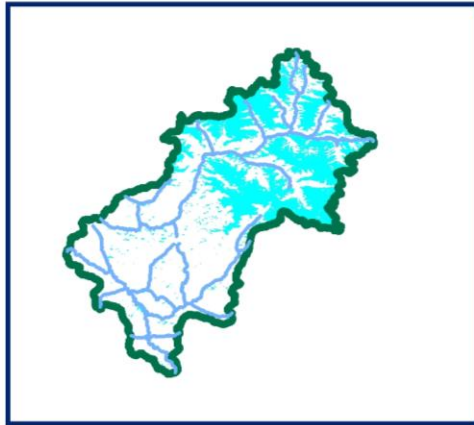


SNOW

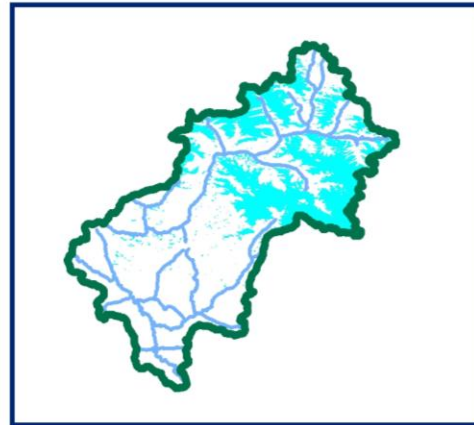




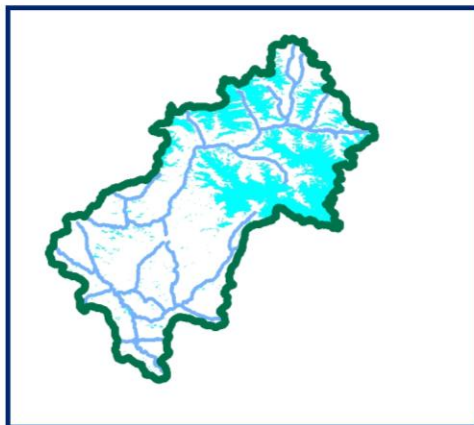
**SNOW COVER MAP : BHAGIRATHI BASIN**



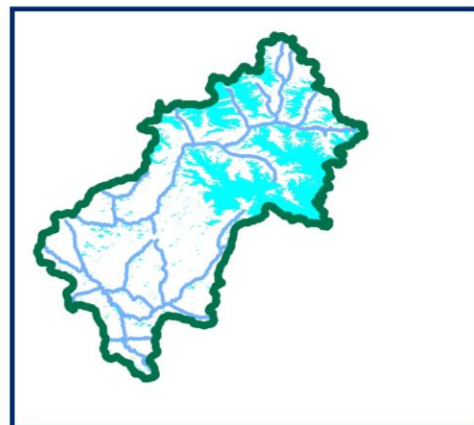
**01 DECEMBER 2013**



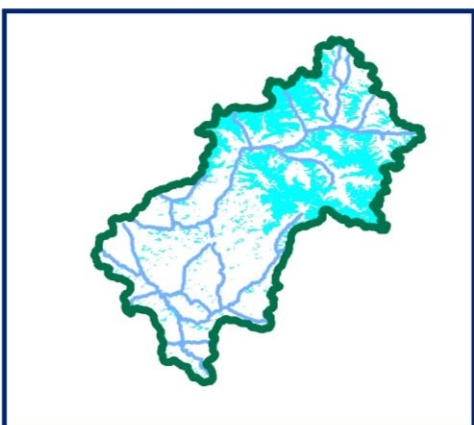
**10 DECEMBER 2013**



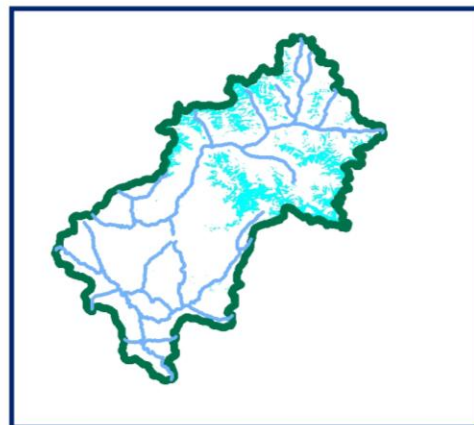
**11 DECEMBER 2013**



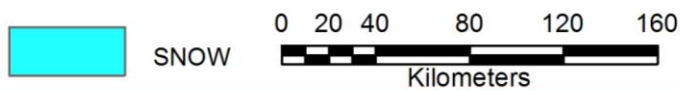
**16 DECEMBER 2013**



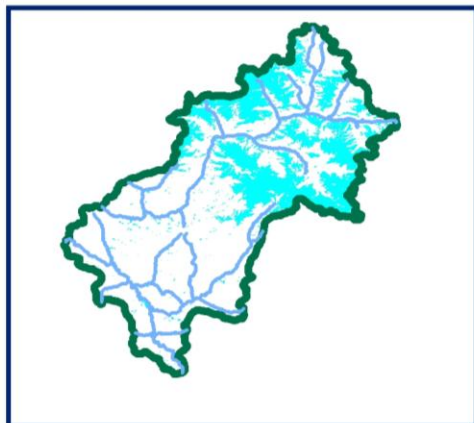
**25 DECEMBER 2013**



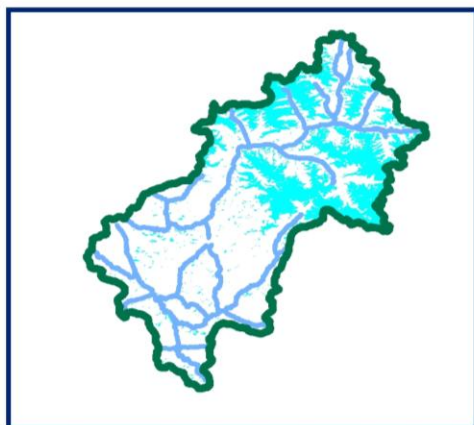
**27 DECEMBER 2013**



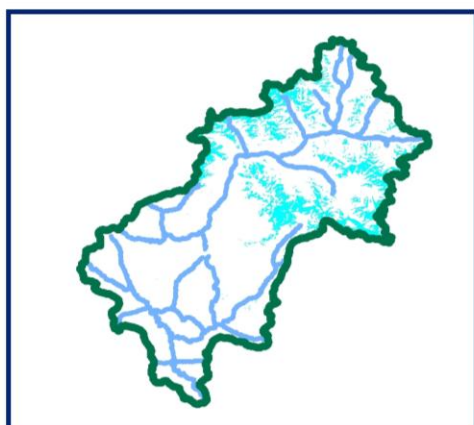
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**01 DECEMBER 2013**



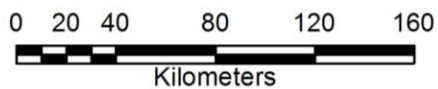
DATA USED  
**11 DECEMBER 2013**



DATA USED  
**27 DECEMBER 2013**

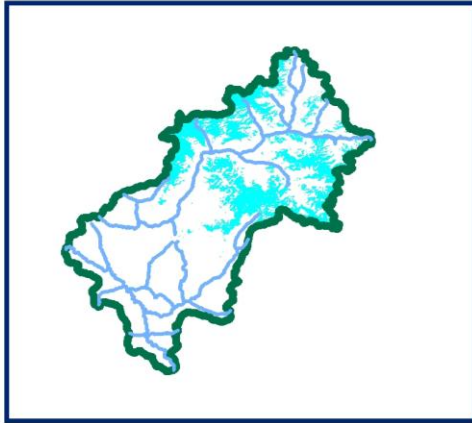


SNOW

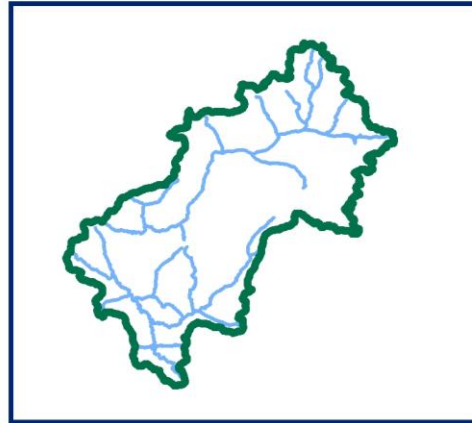


**SNOW COVER MAP**

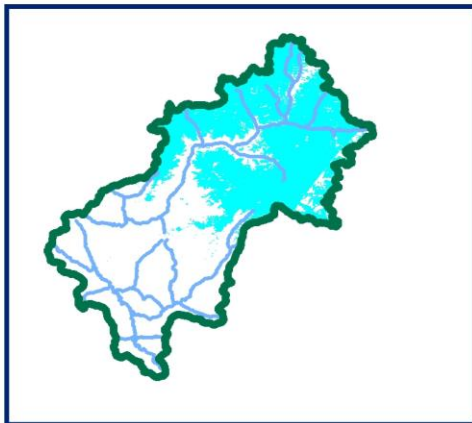
**: BHAGIRATHI BASIN**



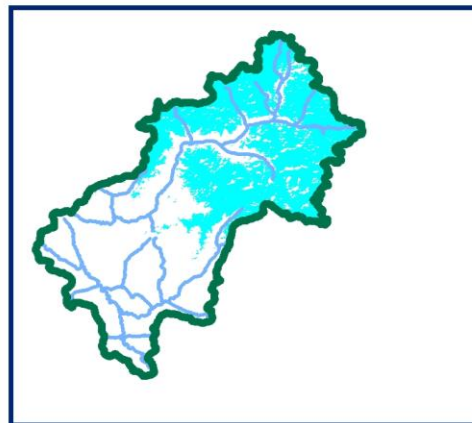
**01 JANUARY 2014**



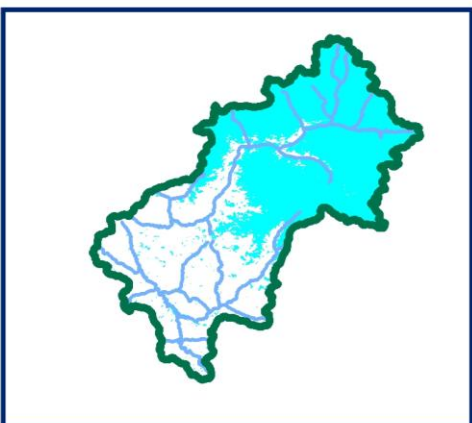
**DATA NOT AVILABLE**



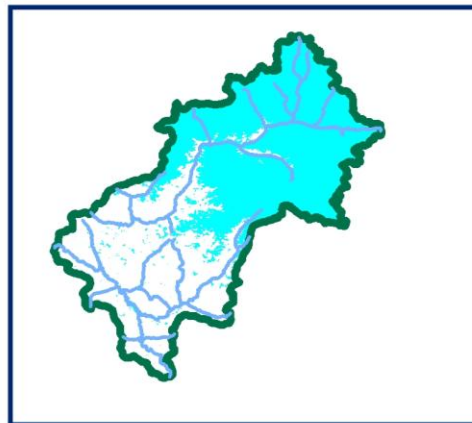
**11 JANUARY 2014**



**16 JANUARY 2014**



**23 JANUARY 2014**



**28 JANUARY 2014**



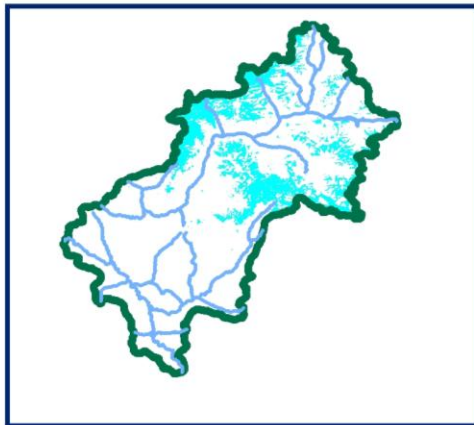
**SNOW**

0 20 40 80 120 160

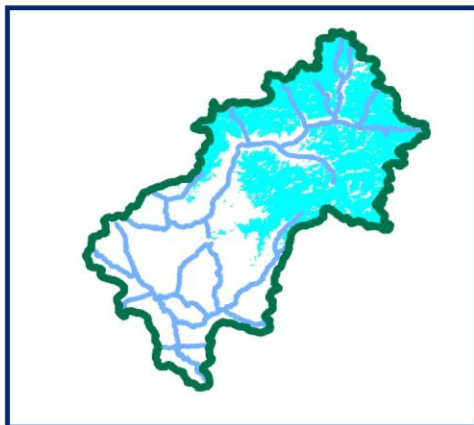


**Kilometers**

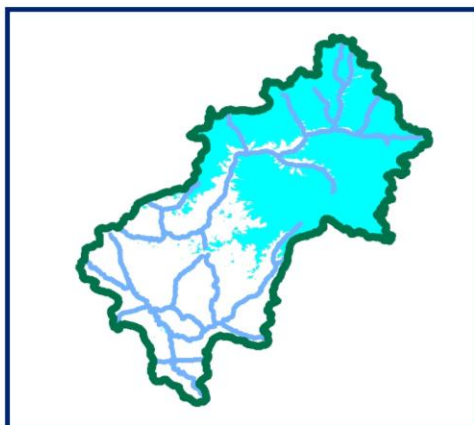
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**01 JANUARY 2014**



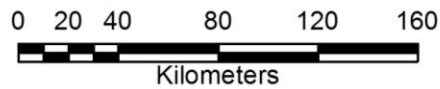
DATA USED  
**16 JANUARY 2014**



DATA USED  
**28 JANUARY 2014**



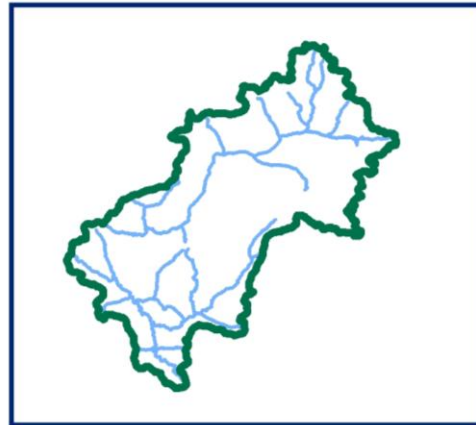
SNOW



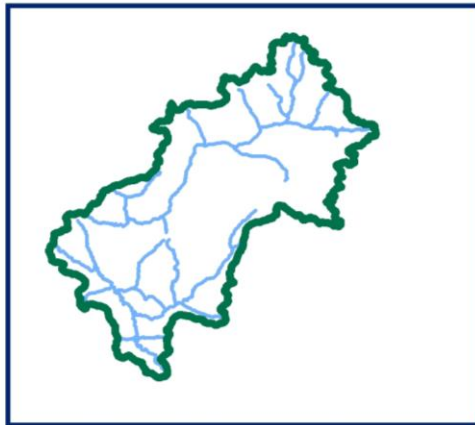
# SNOW COVER MAP : BHAGIRATHI BASIN



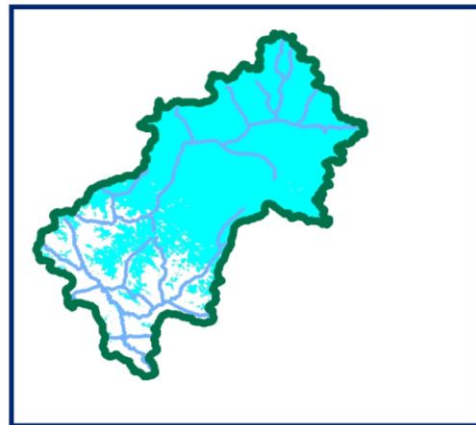
**02 FEBRUARY 2014**



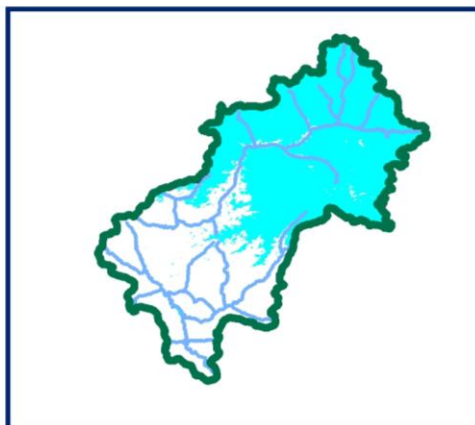
**DATA NOT AVAILABLE**



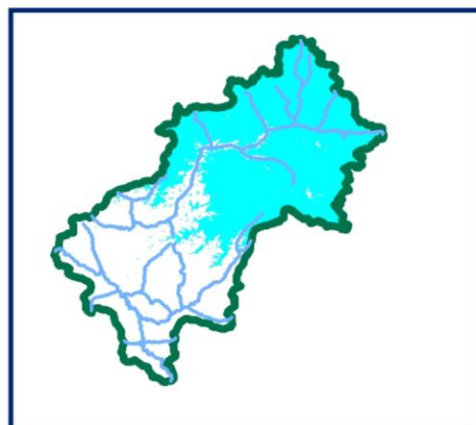
**DATA NOT AVAILABLE**



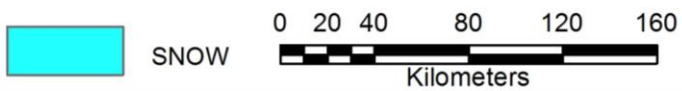
**16 FEBRUARY 2014**



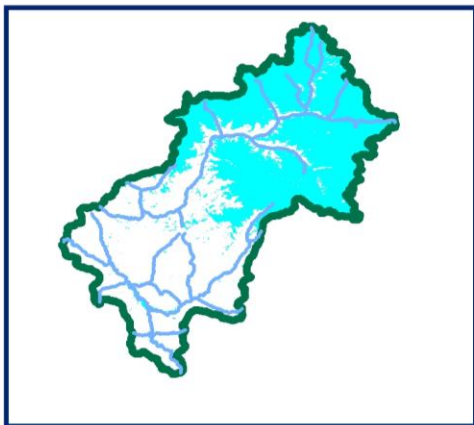
**21 FEBRUARY 2014**



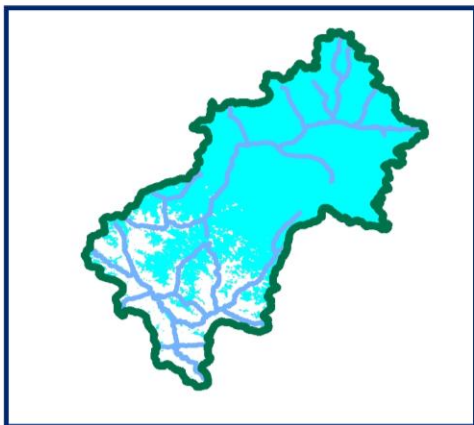
**26 FEBRUARY 2014**



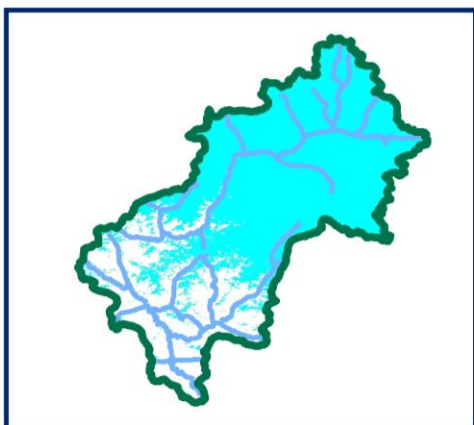
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**02 FEBRUARY 2014**



DATA USED  
**16 FEBRUARY 2014**



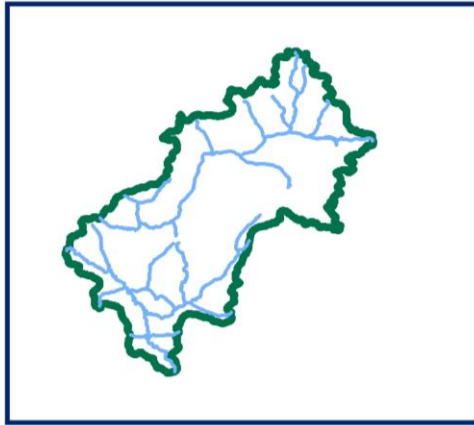
DATA USED  
**21 FEBRUARY 2014**



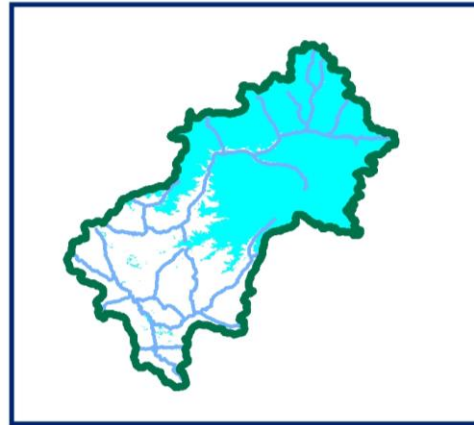
SNOW



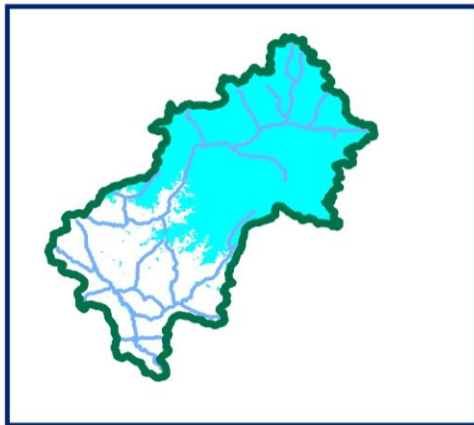
# SNOW COVER MAP : BHAGIRATHI BASIN



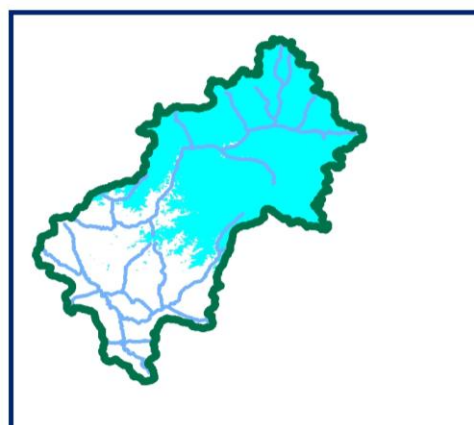
DATA NOT AVILABLE



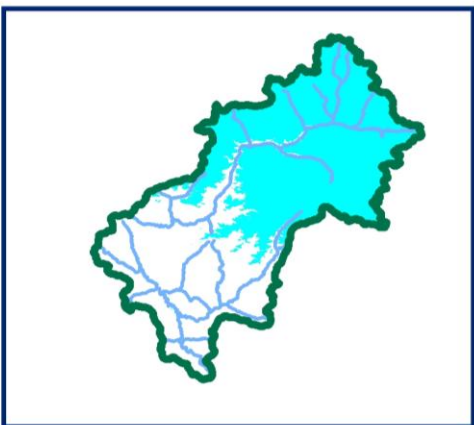
07 MARCH 2014



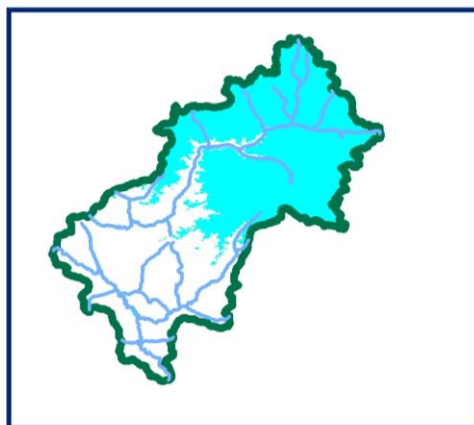
12 MARCH 2014



16 MARCH 2014



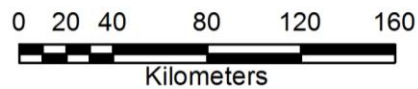
22 MARCH 2014



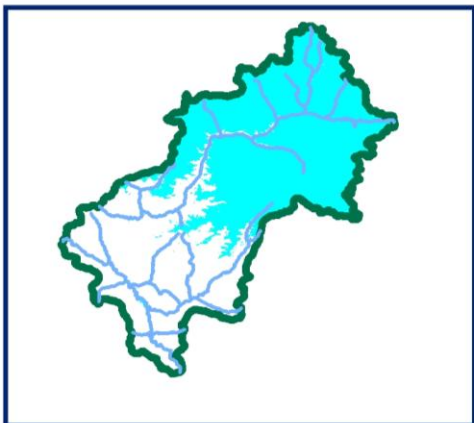
31 MARCH 2014



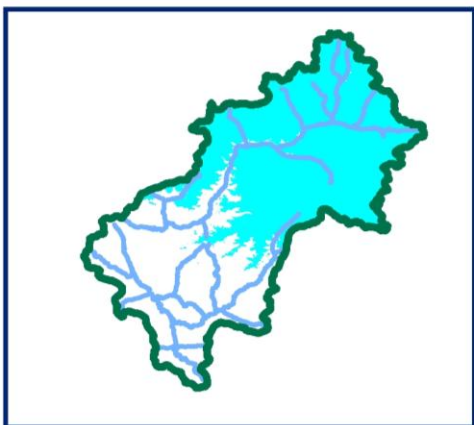
SNOW



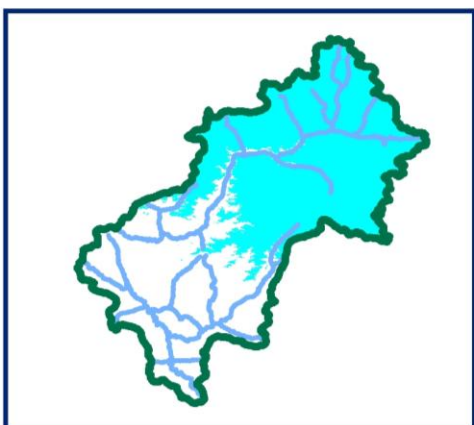
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**07 MARCH 2014**



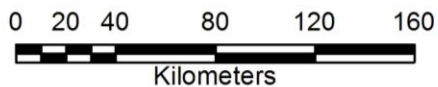
DATA USED  
**16 MARCH 2014**



DATA USED  
**22 MARCH 2014**



SNOW





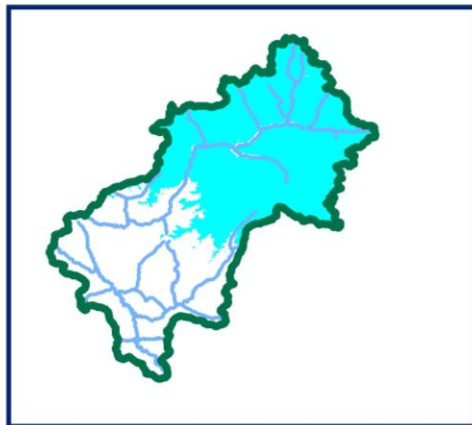
# SNOW COVER MAP : BHAGIRATHI BASIN



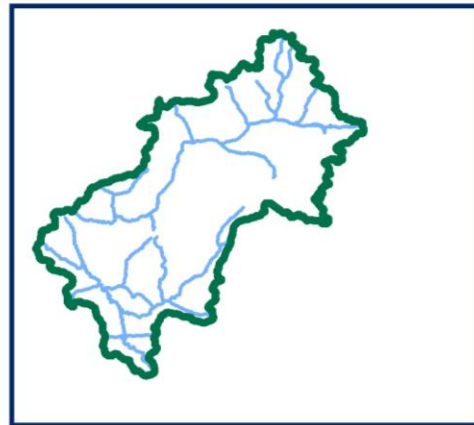
02 APRIL 2014



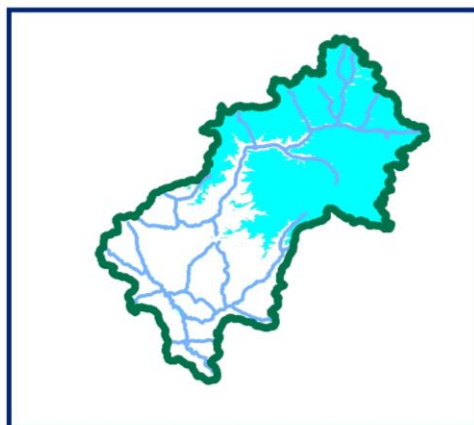
10 APRIL 2014



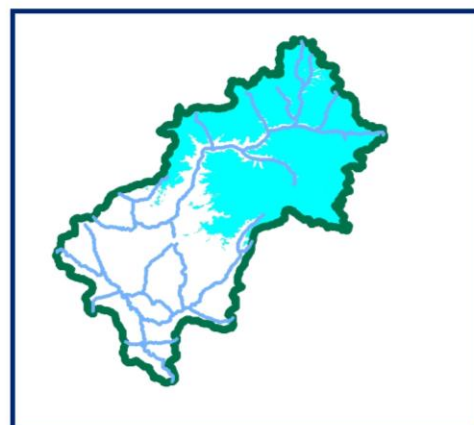
14 APRIL 2014



DATA NOT AVILABLE



24 APRIL 2014



26 APRIL 2014



SNOW

0 20 40 80 120 160

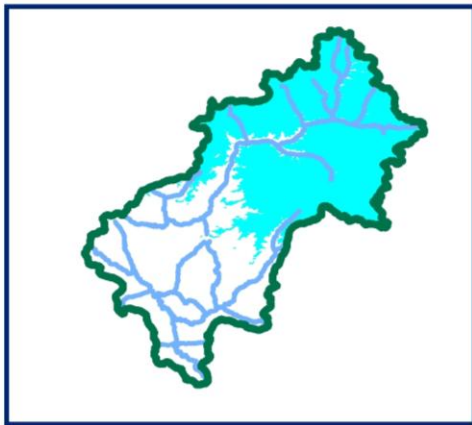


Kilometers

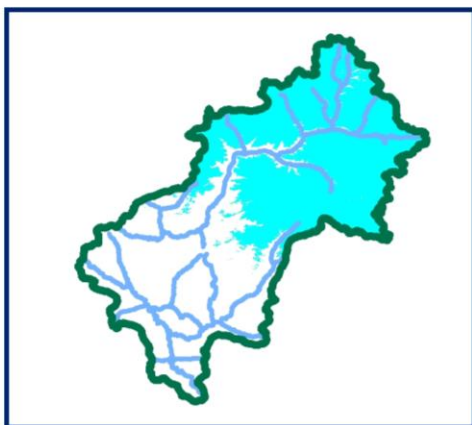
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**05 APRIL 2014**



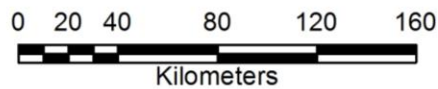
DATA USED  
**15 APRIL 2014**



DATA USED  
**26 APRIL 2014**



SNOW

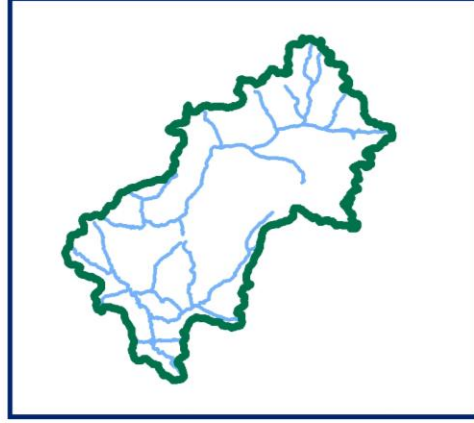


**SNOW COVER MAP**

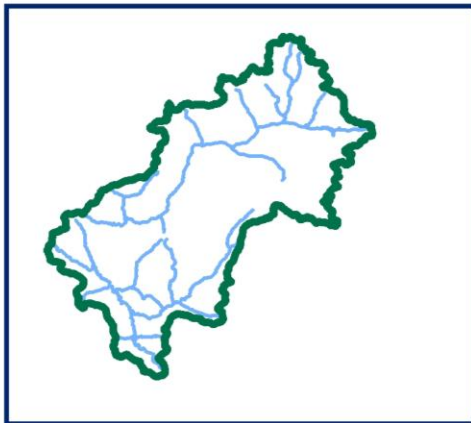
**: BHAGIRATHI BASIN**



**01 MAY 2014**



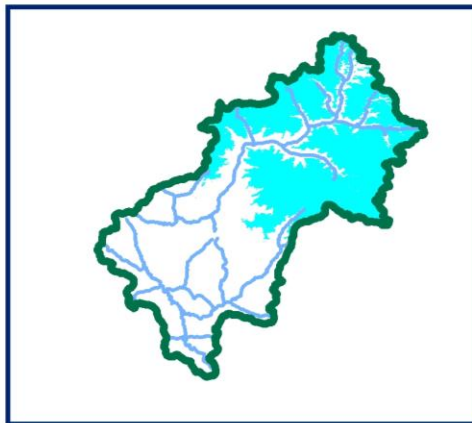
**DATA NOT AVILABLE**



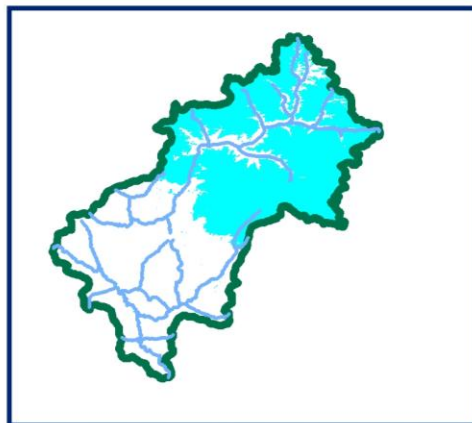
**DATA NOT AVILABLE**



**16 MAY 2014**



**21 MAY 2014**



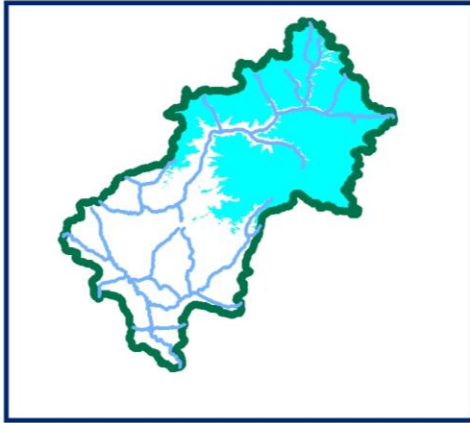
**25 MAY 2014**



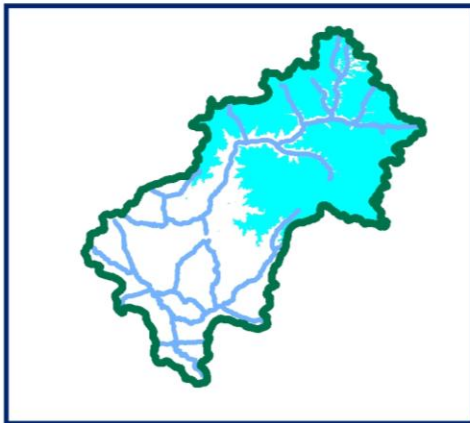
**SNOW**



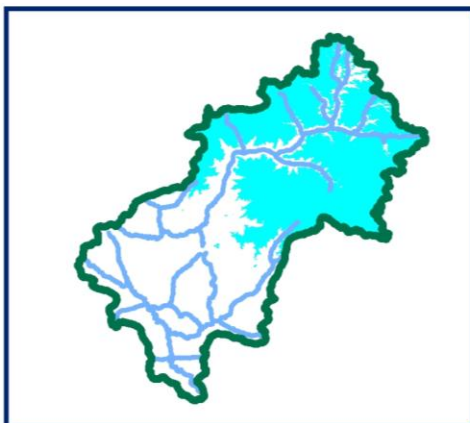
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**01 MAY 2014**



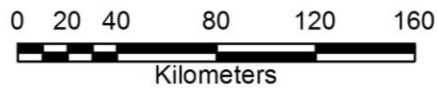
DATA USED  
**16 MAY 2014**



DATA USED  
**28 MAY 2014**



SNOW



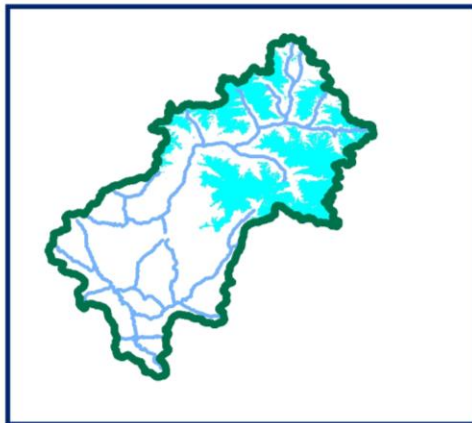
**SNOW COVER MAP : BHAGIRATHI BASIN**



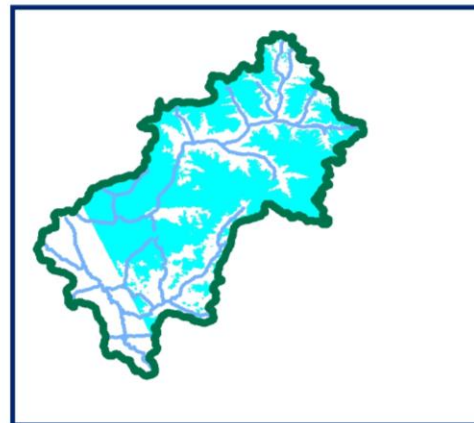
**02 JUNE 2014**



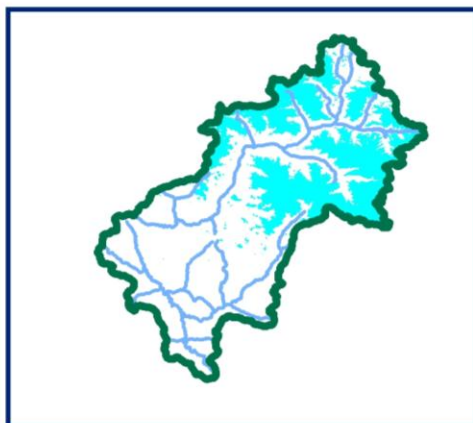
**09 JUNE 2014**



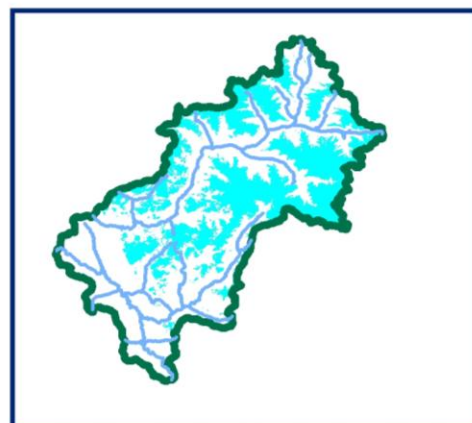
**14 JUNE 2014**



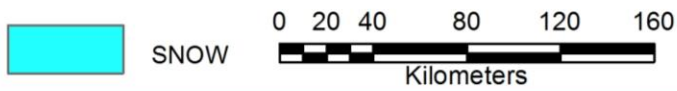
**16 JUNE 2014**



**25 JUNE 2014**



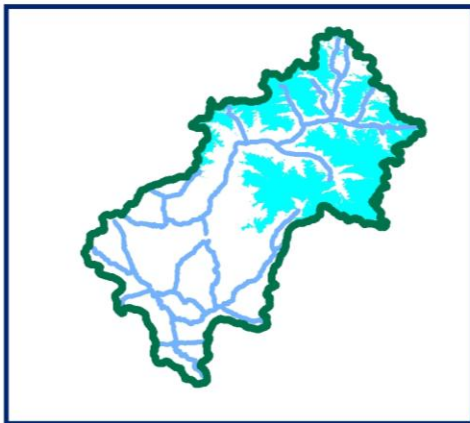
**28 JUNE 2014**



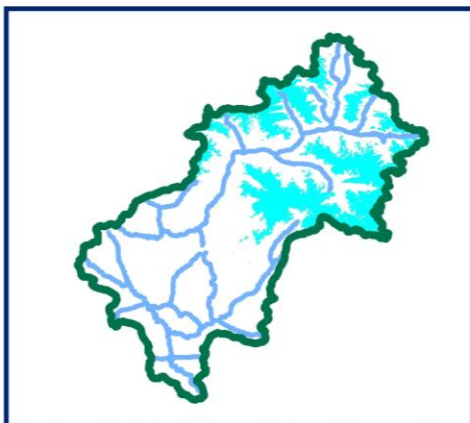
**10 DAILY SNOW COVER MAP: BHAGIRATHI BASIN**



DATA USED  
**04 JUNE 2014**



DATA USED  
**14 JUNE 2014**



DATA USED  
**28 JUNE 2014**



SNOW



# *YAMUNA SUB-BASIN*

**AREAL EXTENT OF SNOW (5 DAILY)**

**BASIN NAME: YAMUNA**

**BASIN AREA: 3527 sq km**

S No	Date	Snow cover (sq km)	Snow cover (%)	S No	Date	Snow cover (sq km)	Snow cover (%)
<b>October 2013</b>							
1	04-Oct-2013	462	13	6	17-Oct-2013	243	7
2	05-Oct-2013	256	7	7	18-Oct-2013	329	9
3	07-Oct-2013	272	8	8	28-Oct-2013	353	10
4	09-Oct-2013	324	9	9	29-Oct-2013	225	6
5	14-Oct-2013	401	11				
<b>November 2013</b>							
10	02-Nov-2013	436	12	13	17-Nov-2013	1084	31
11	12-Nov-2013	1265	36	14	21-Nov-2013	1035	29
12	16-Nov-2013	1067	30	15	22-Nov-2013	408	12
<b>December 2013</b>							
16	01-Dec-2013	717	20	22	19-Dec-2013	678	19
17	10-Dec-2013	738	21	23	20-Dec-2013	919	26
18	11-Dec-2013	707	20	24	25-Dec-2013	1526	43
19	15-Dec-2013	664	19	25	27-Dec-2013	696	20
20	16-Dec-2013	330	9	26	30-Dec-2013	1482	42
21	18-Dec-2013	340	10				
<b>January 2014</b>							
27	1-Jan-14	986	28	30	20-Jan-14	1375	39
28	11-Jan-14	1395	40	31	23-Jan-14	2433	69
29	16-Jan-14	1222	35	32	28-Jan-14	2507	71
<b>February 2014</b>							
33	2-Feb-14	584	17	36	21-Feb-14	2444	69
34	16-Feb-14	3185	90	37	25-Feb-14	2696	76
35	18-Feb-14	2646	75	38	26-Feb-14	556	16
<b>March 2014</b>							
39	7-March-14	1911	54	42	22-March-14	572	16
40	12-March-14	2324	66	43	31-March-14	1458	41
41	16-March-14	2091	59				
<b>April 2014</b>							
44	2-April-14	2273	64	48	14-April-14	1530	43
45	5-April-14	1634	46	49	15-April-14	589	17
46	9-April-14	1971	56	50	26-April-14	1138	32



47	10-April-14	1418	40	51	28-April-14	1336	38
<b>May 2014</b>							
52	1-May-14	1218	35	57	18-May-14	1159	33
53	3-May-14	2088	59	58	20-May-14	1036	29
54	4-May-14	2104	60	59	21-May-14	416	12
55	8-May-14	1175	33	60	25-May-14	1059	30
56	16-May-14	1105	31	61	28-May-14	980	28
<b>June 2014</b>							
62	2-June-14	548	16	67	13-June-14	714	20
63	4-June-14	756	21	68	14-June-14	443	13
64	6-June-14	856	24	69	16-June-14	2826	80
65	9-June-14	747	21	70	25-June-14	2139	61
66	11-June-14	756	21	71	28-June-14	586	17

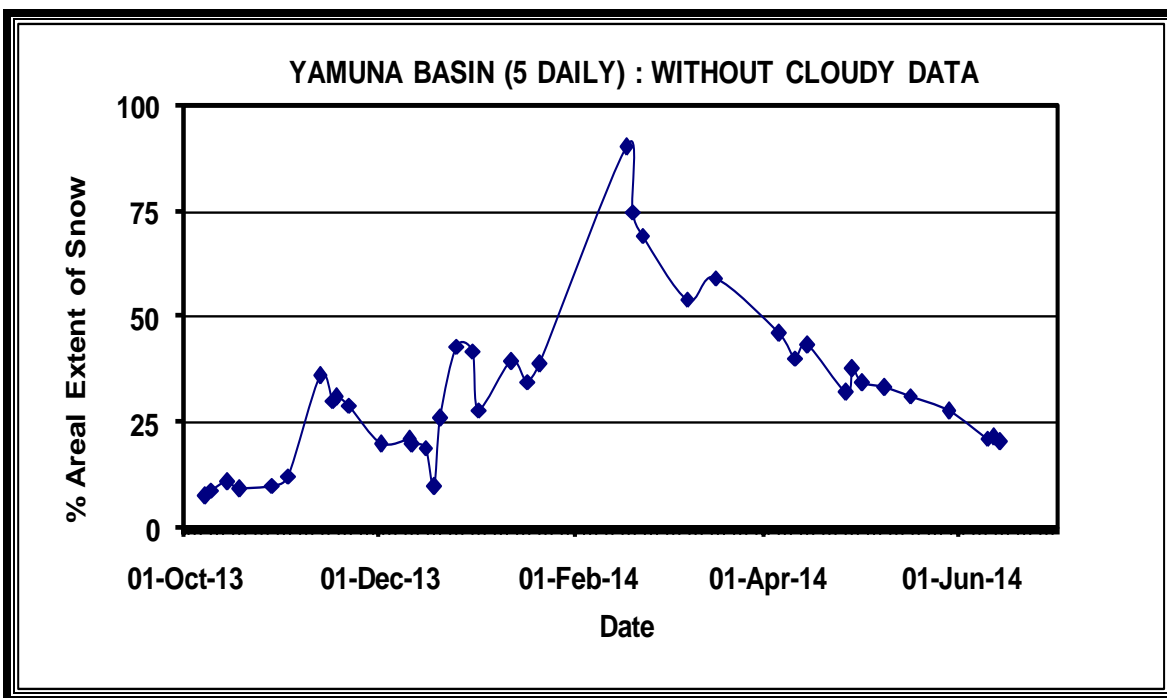
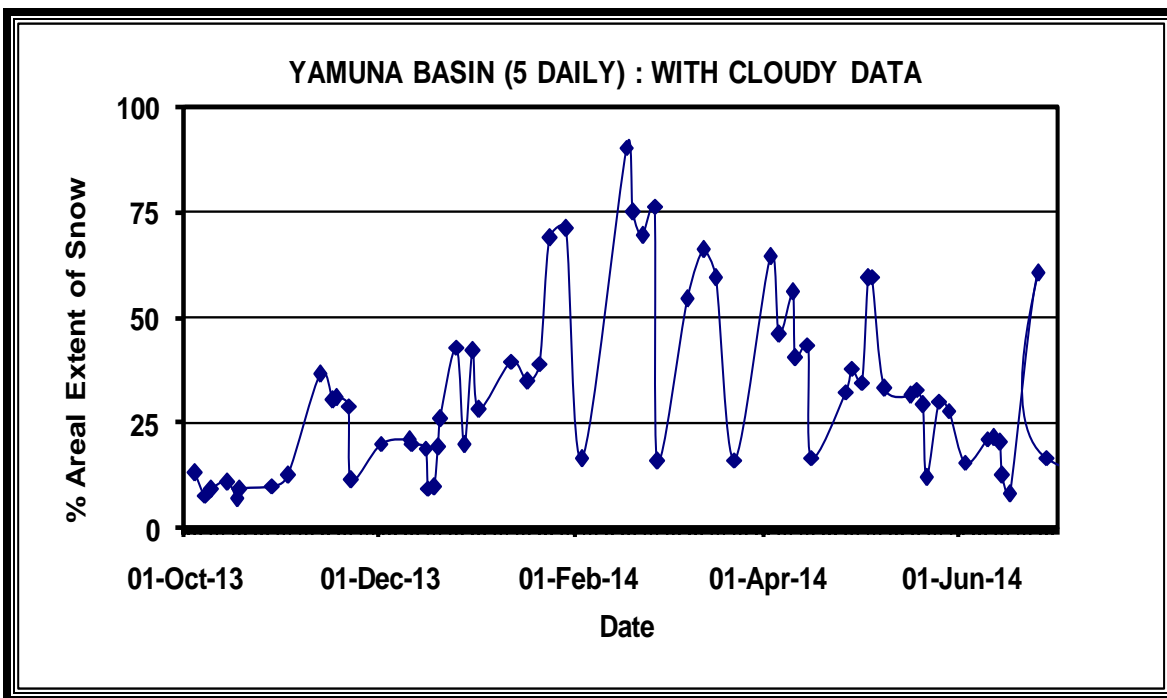
**AREAL EXTENT OF SNOW (10 DAILY)**

**BASIN NAME: YAMUNA**

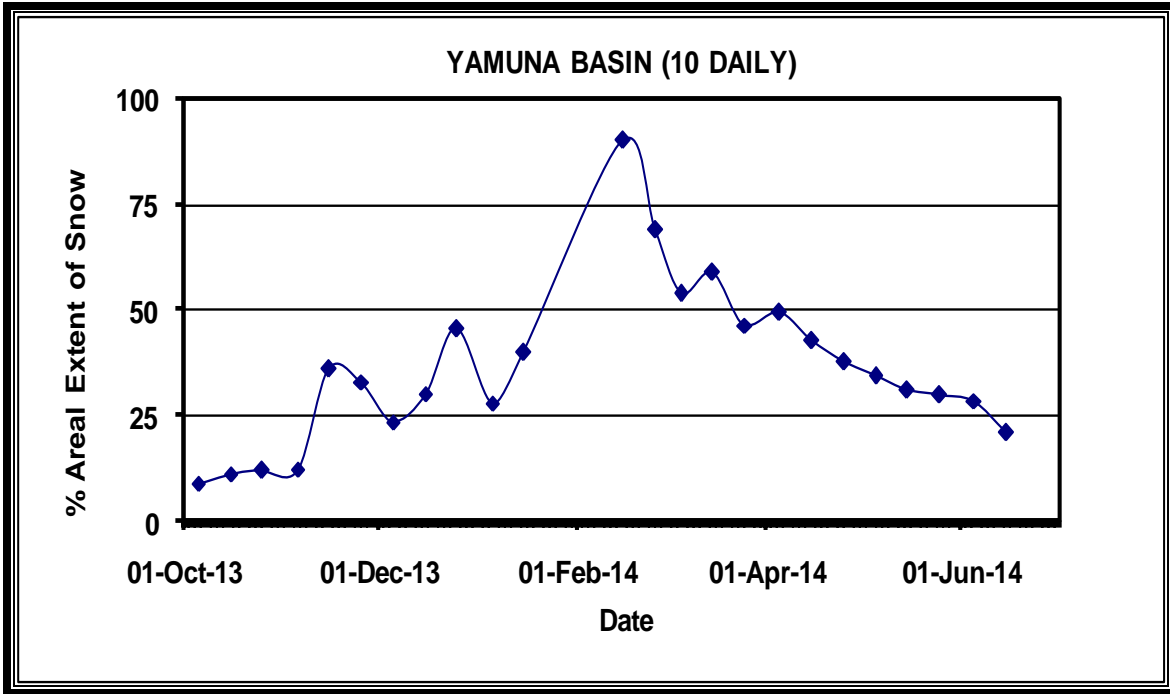
**BASIN AREA: 3527 sq km**

<b>S No</b>	<b>Date</b>	<b>Snow cover (sq km)</b>	<b>Snow cover (%)</b>	<b>S No</b>	<b>Date</b>	<b>Snow cover (sq km)</b>	<b>Snow cover (%)</b>
<b>October 2010</b>							
1	5-Oct-13	317	9	3	25-Oct-13	424	12
2	15-Oct-13	400	11				
<b>November 2010</b>							
4	5-Nov-13	436	12	6	25-Nov-13	1168	33
5	15-Nov-13	1281	36				
<b>December 2010</b>							
7	5-Dec-13	834	24	9	25-Dec-13	1611	46
8	15-Dec-13	1070	30				
<b>January 2011</b>							
10	5-Jan-14	988	28	11	15-Jan-14	1411	40
<b>February 2011</b>							
12	15-Feb-14	3185	90	13	25-Feb-14	2433	69
<b>March 2011</b>							
14	5-March-14	1910	54	16	25-March-14	1641	47
15	15-March-14	2081	59				
<b>April 2011</b>							
17	5-April-14	1743	49	19	25-April-14	1339	38
18	15-April-14	1516	43				
<b>May 2011</b>							
20	5-May-14	1218	35	22	25-May-14	1060	30
21	15-May-14	1104	31				
<b>June 2014</b>							
23	5-June-14	1013	29	24	15-June-14	745	21

### Snow cover depletion curve



### Snow cover depletion curve

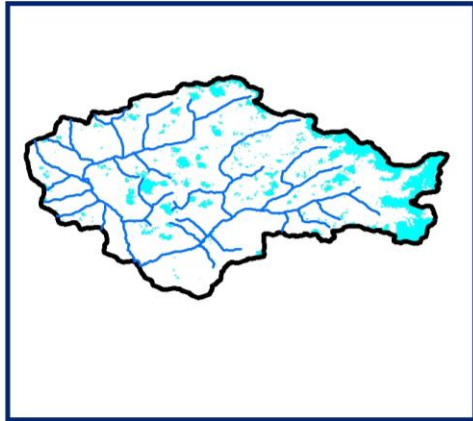


# *SNOW COVER MAP*

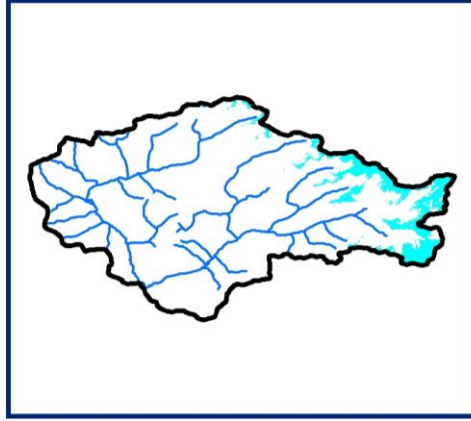
**SNOW COVER MAP**

:

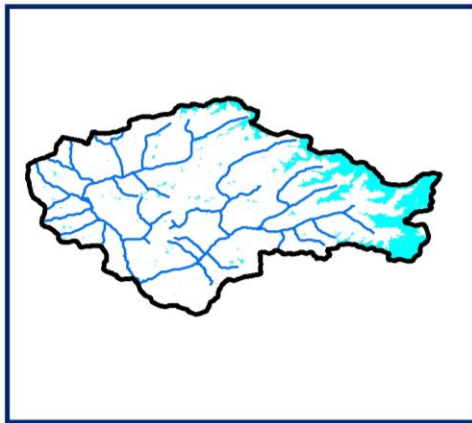
**YAMUNA BASIN**



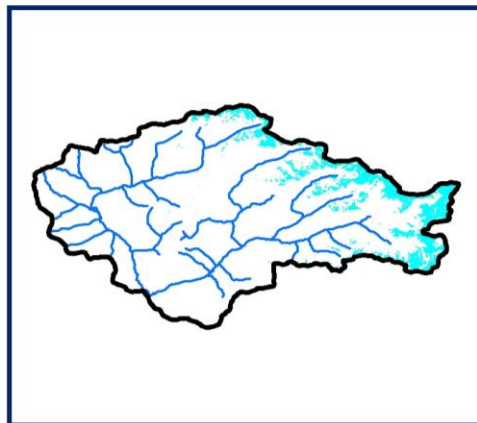
**04 OCTOBER 2013**



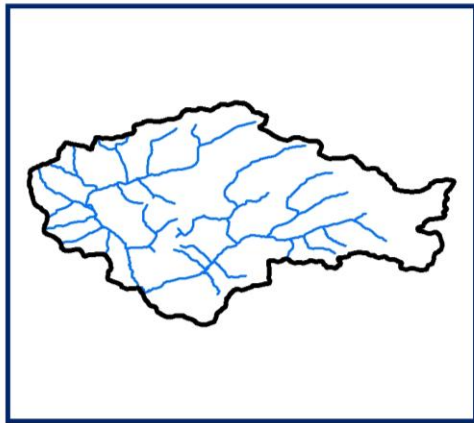
**07 OCTOBER 2013**



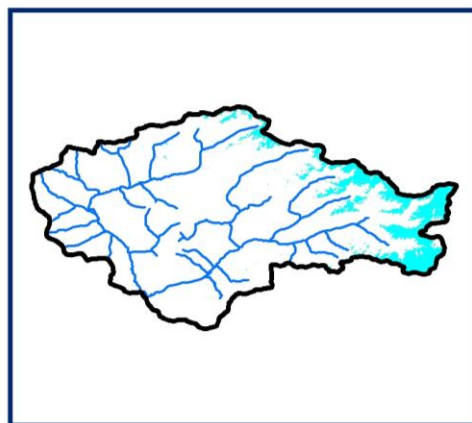
**14 OCTOBER 2013**



**18 OCTOBER 2013**



**DATA NOT AVAILABLE**



**28 OCTOBER 2013**



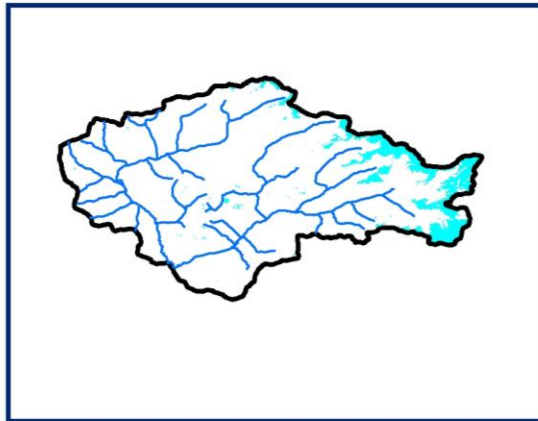
SNOW

0 12.5 25 50 75 100



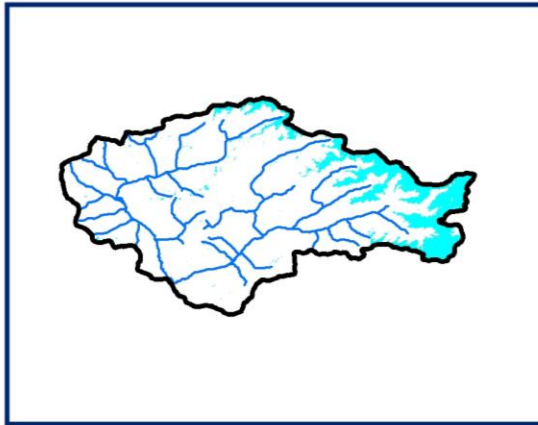
Kilometers

**10 DAILY SNOW COVER MAP: YAMUNA BASIN**

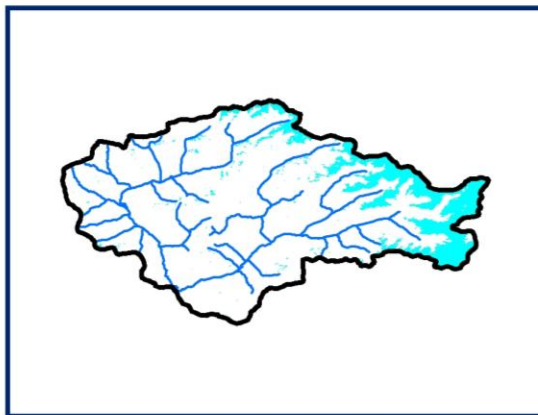


**DATA USED**

**07 OCTOBER 2013**



**14 OCTOBER 2013**



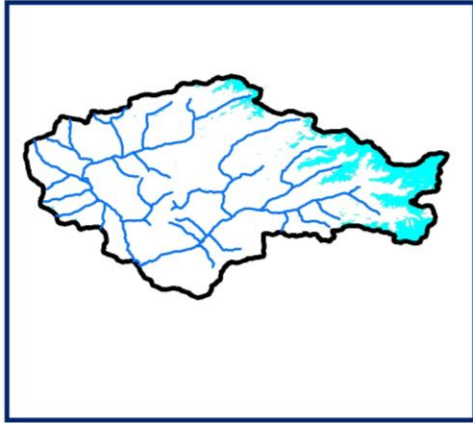
**28 OCTOBER 2013**

 SNOW

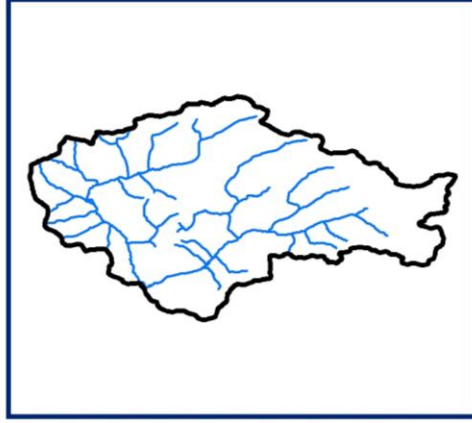
0 12.5 25 50 75 100  
Kilometers

**SNOW COVER MAP**

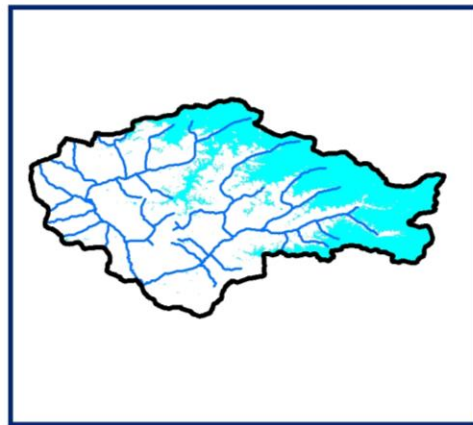
**: YAMUNA BASIN**



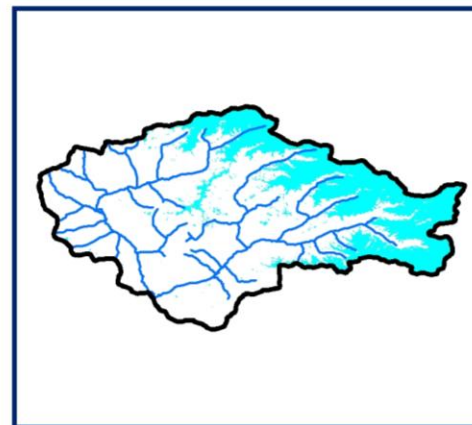
**02 NOVEMBER 2013**



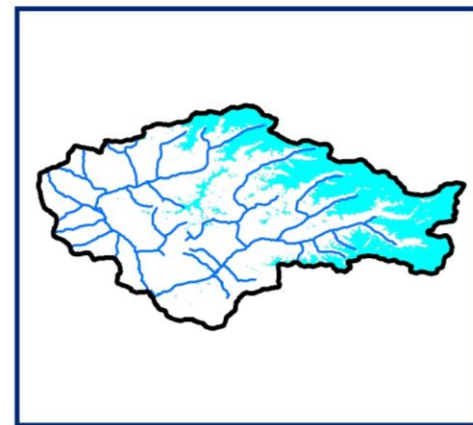
**DATA NOT AVAILABLE**



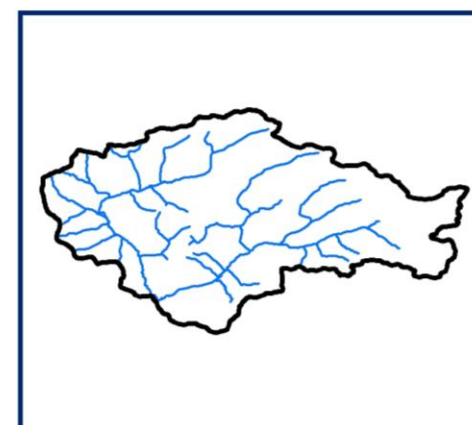
**12 NOVEMBER 2013**



**16 NOVEMBER 2013**



**21 NOVEMBER 2013**



**DATA NOT AVAILABLE**



**SNOW**

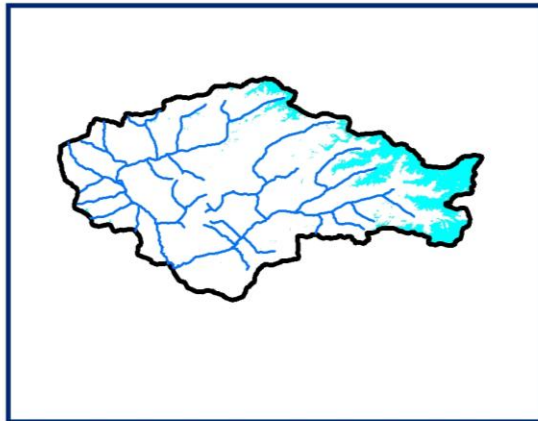
0 12.5 25 50 75 100



**Kilometers**

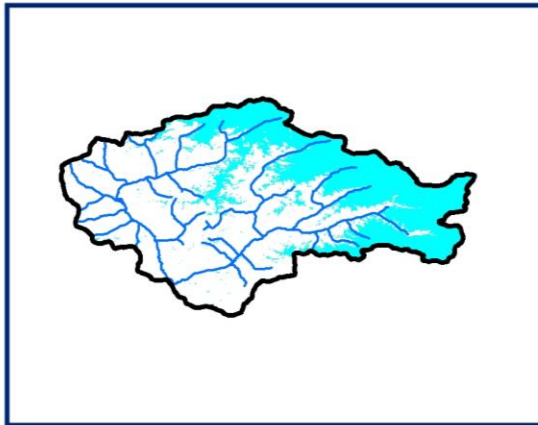


**10 DAILY SNOW COVER MAP: YAMUNA BASIN**

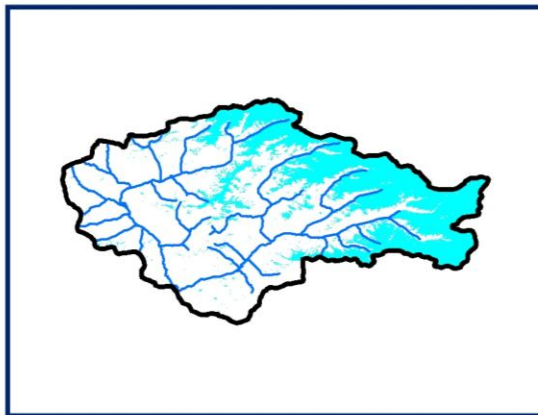


**DATA USED**

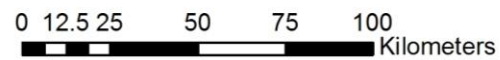
**02 NOVEMBER 2013**



**12 NOVEMBER 2013**



**21 NOVEMBER 2013**



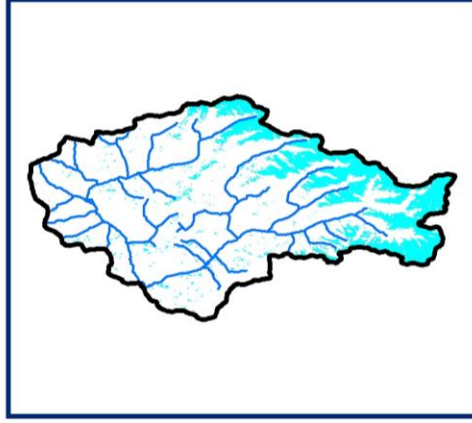
**SNOW COVER MAP**

:

**YAMUNA BASIN**



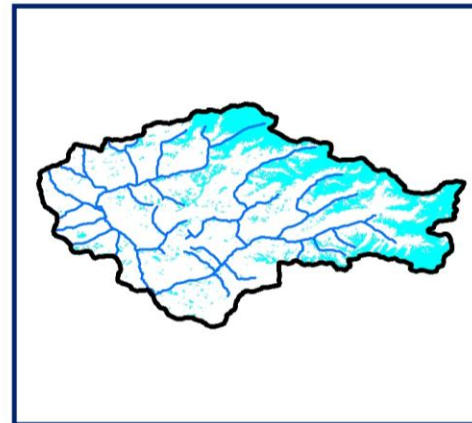
**01 DECEMBER 2013**



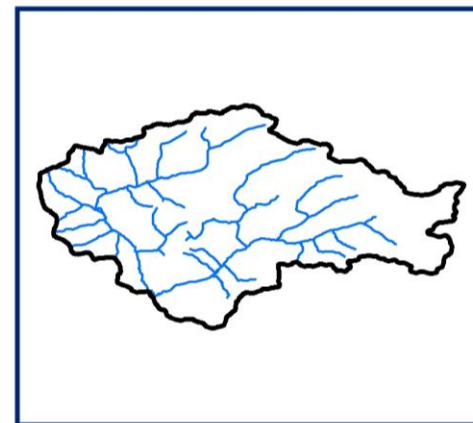
**10 DECEMBER 2013**



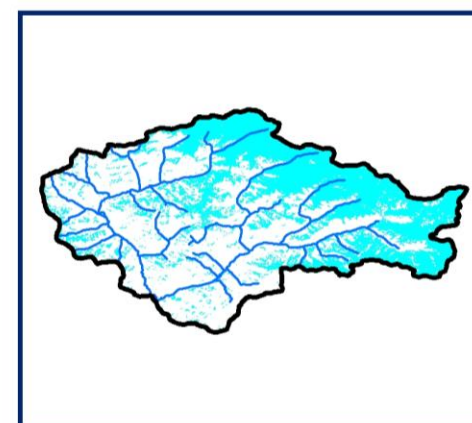
**11 DECEMBER 2013**



**20 DECEMBER 2013**



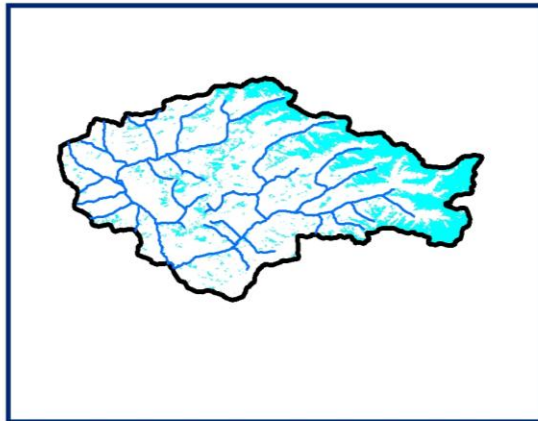
**DATA NOT AVAILABLE**



**25 DECEMBER 2013**

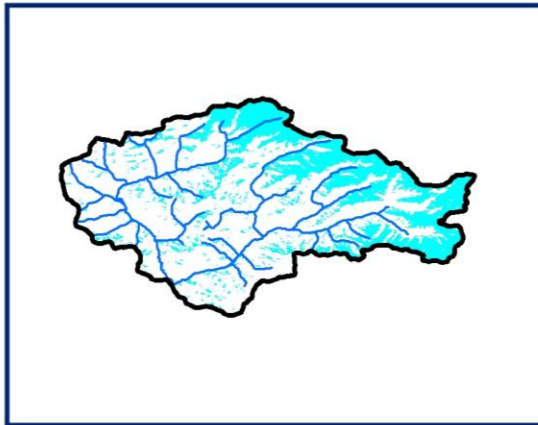


**10 DAILY SNOW COVER MAP: YAMUNA BASIN**

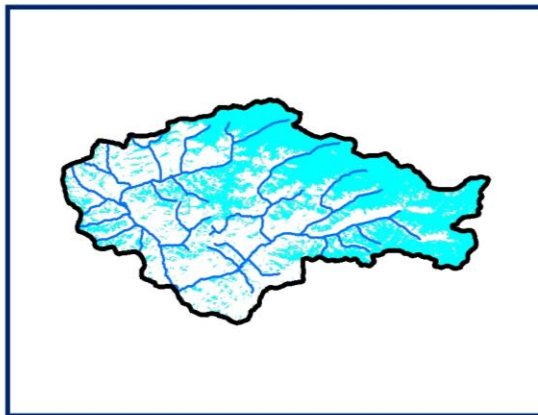


**DATA USED**

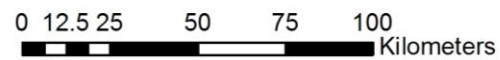
**01 DECEMBER 2013**



**20 DECEMBER 2013**



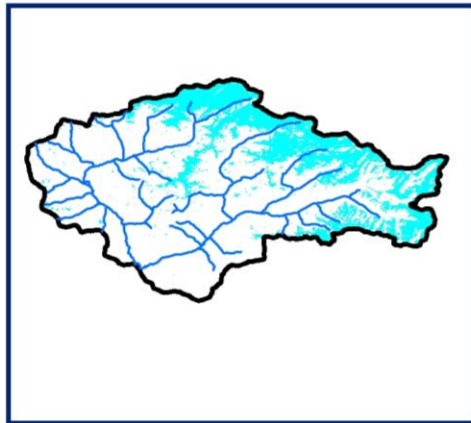
**25 DECEMBER 2013**



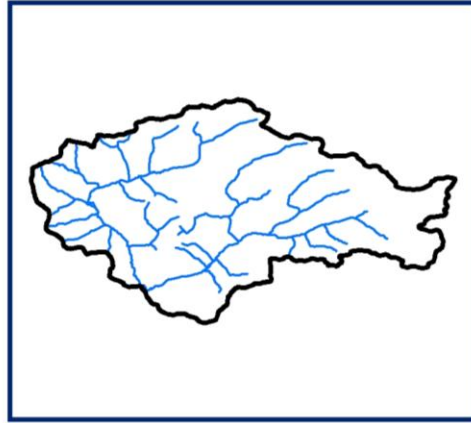
# SNOW COVER MAP

:

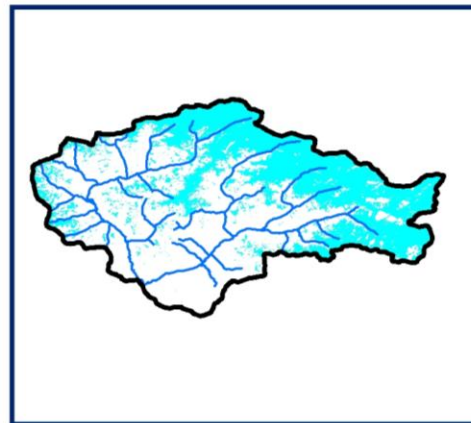
# YAMUNA BASIN



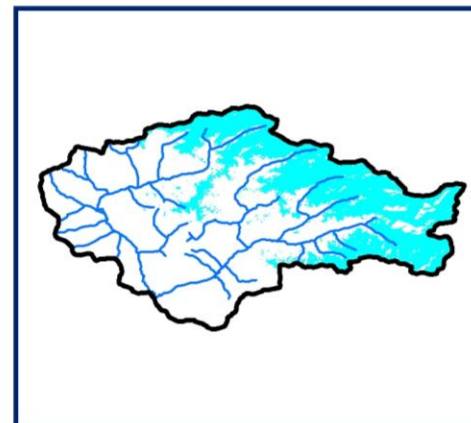
01 JANUARY 2014



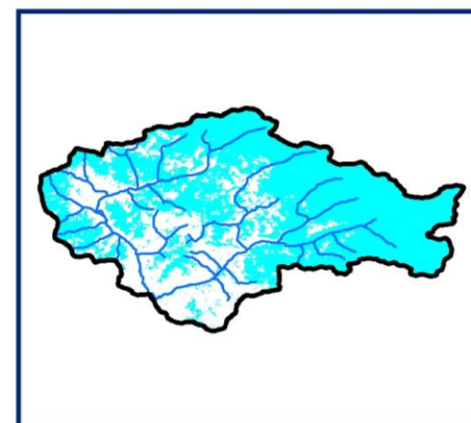
DATA NOT AVAILABLE



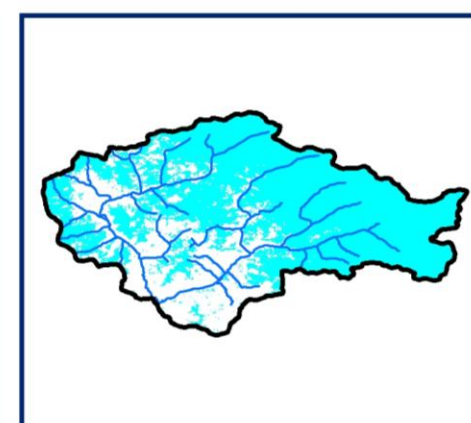
11 JANUARY 2014



16 JANUARY 2014



23 JANUARY 2014



28 JANUARY 2014



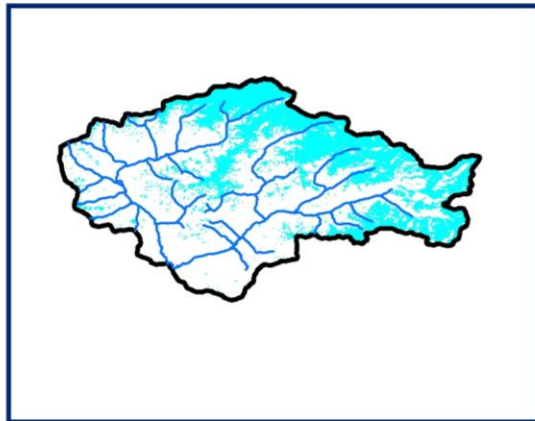
SNOW

0 12.5 25 50 75 100



Kilometers

# 10 DAILY SNOW COVER MAP: YAMUNA BASIN

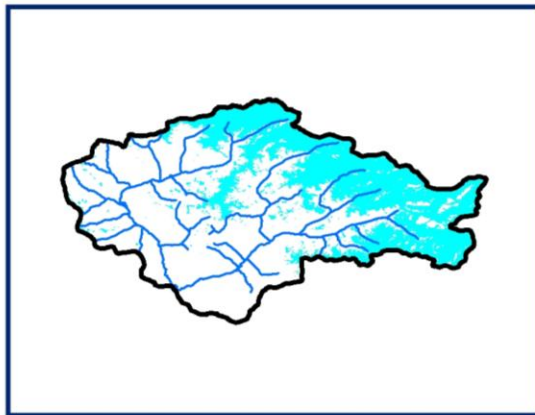


**DATA USED**

**01 JANUARY 2014**



**20 JANUARY 2014**



**30 JANUARY 2014**

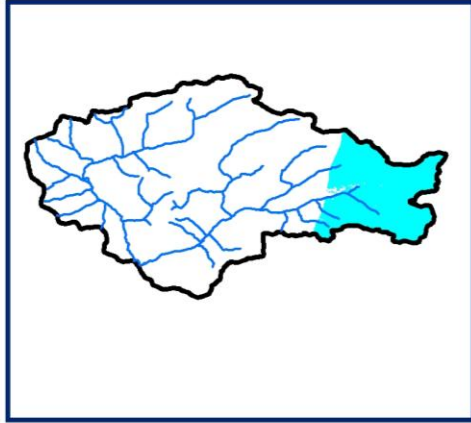
 SNOW

0 12.5 25 50 75 100  
Kilometers

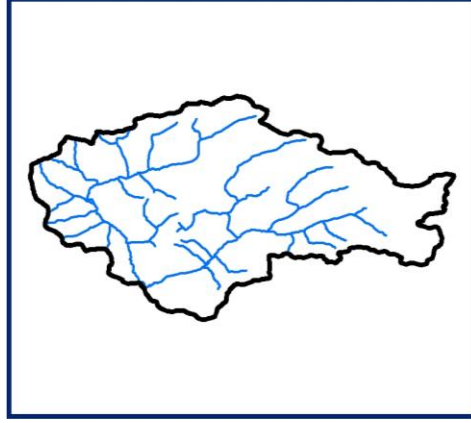
**SNOW COVER MAP**

:

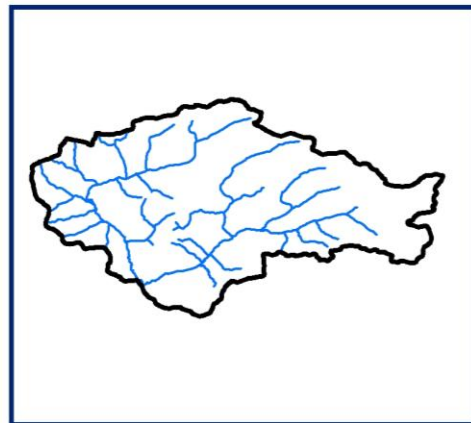
**YAMUNA BASIN**



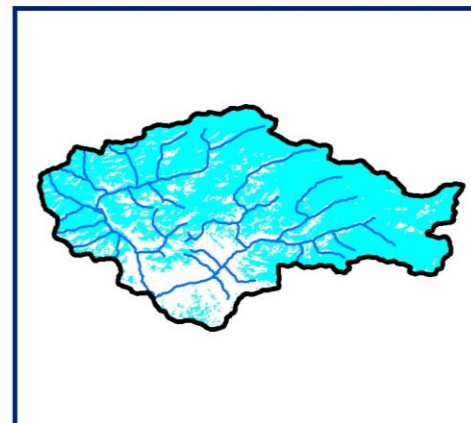
**02 FEBRUARY 2014**



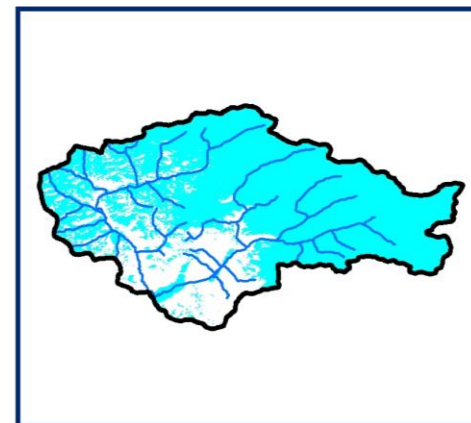
**DATA NOT AVAILABLE**



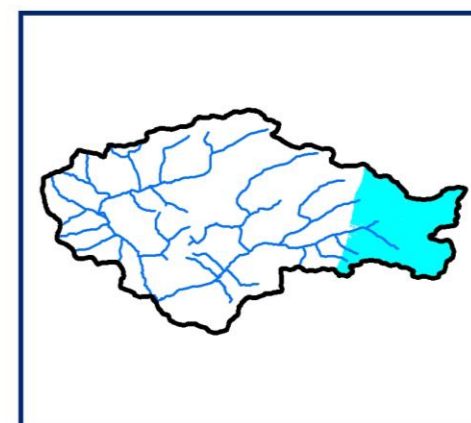
**DATA NOT AVAILABLE**



**18 FEBRUARY 2014**



**25 FEBRUARY 2014**



**26 FEBRUARY 2014**



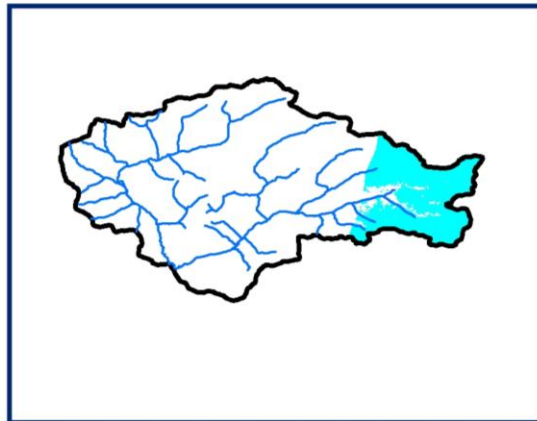
SNOW

0 12.5 25 50 75 100



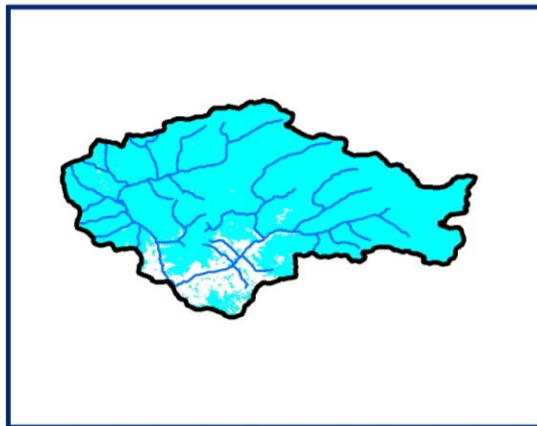
Kilometers

# 10 DAILY SNOW COVER MAP: YAMUNA BASIN

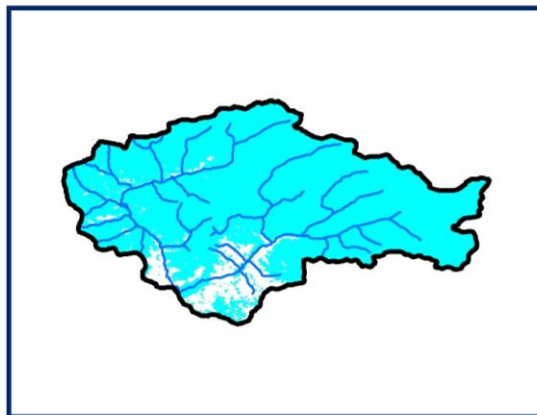


**DATA USED**


**02 FEBRUARY 2014**




**16 FEBRUARY 2014**



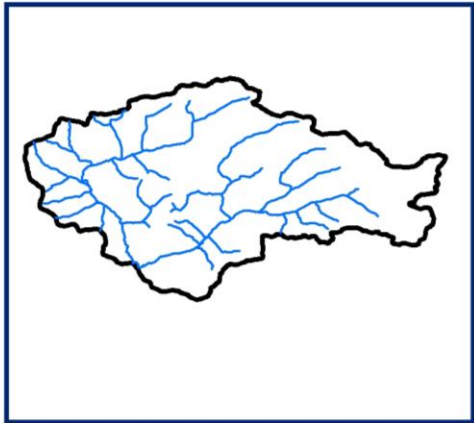
**25 FEBRUARY 2014**

 SNOW

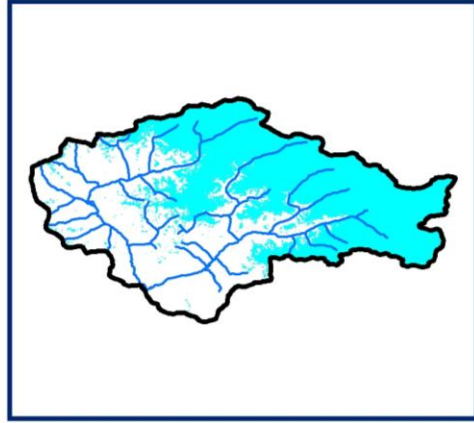
0 12.5 25 50 75 100  
 Kilometers

**SNOW COVER MAP**

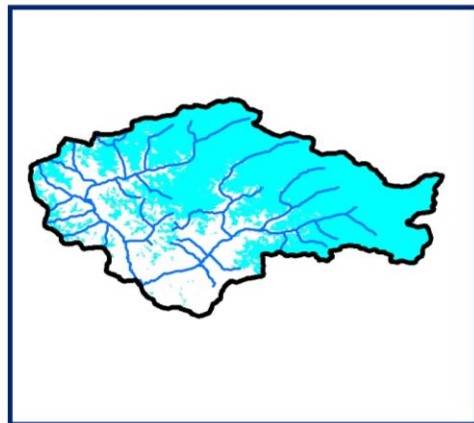
**: YAMUNA BASIN**



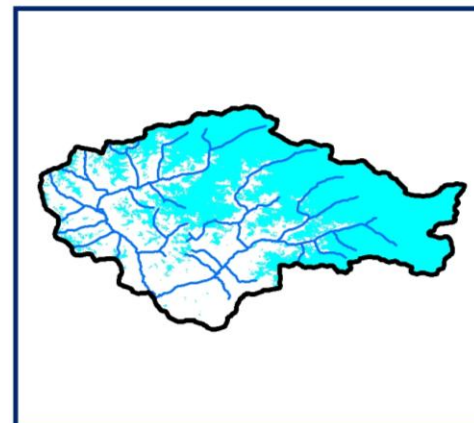
**DATA NOT AVAILABLE**



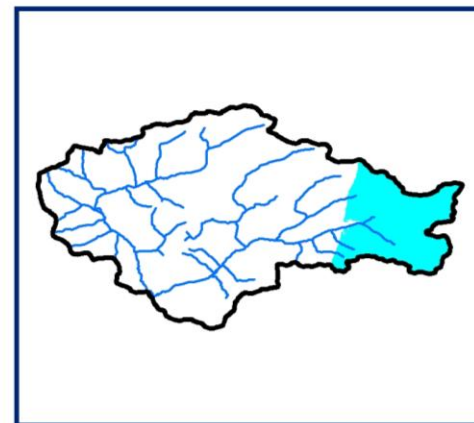
**07 MARCH 2014**



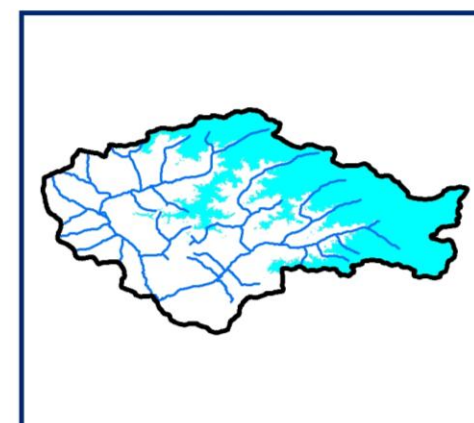
**12 MARCH 2014**



**16 MARCH 2014**



**22 MARCH 2014**



**31 MARCH 2014**



**SNOW**

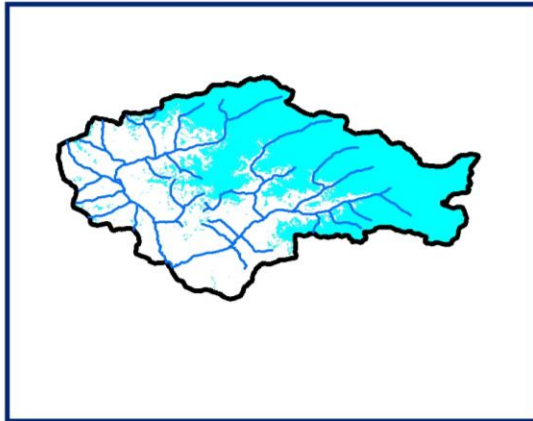
0 12.5 25 50 75 100



**Kilometers**

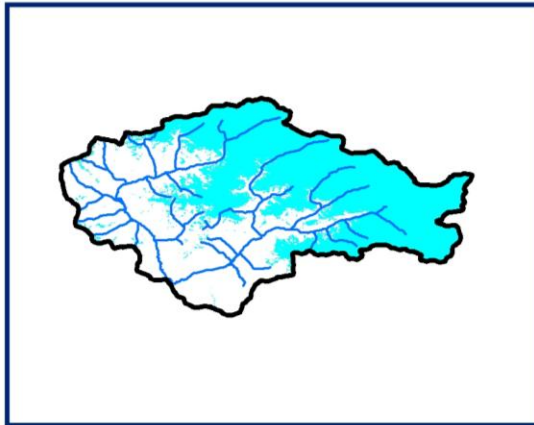


**10 DAILY SNOW COVER MAP: YAMUNA BASIN**

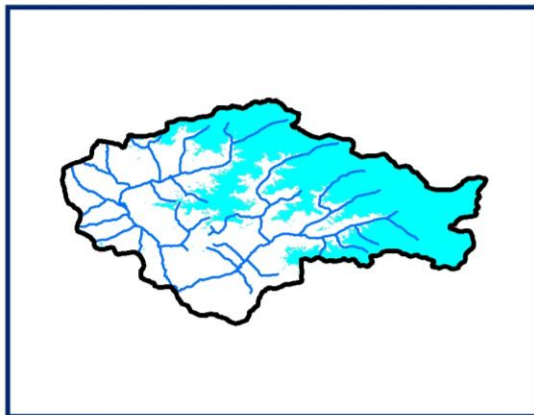


**DATA USED**

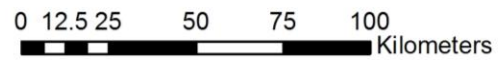
**07 MARCH 2014**



**16 MARCH 2014**

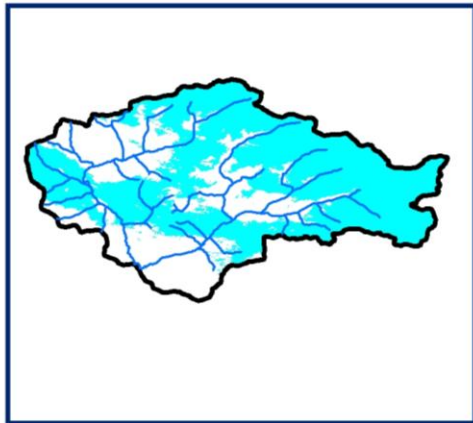


**31 MARCH 2014**

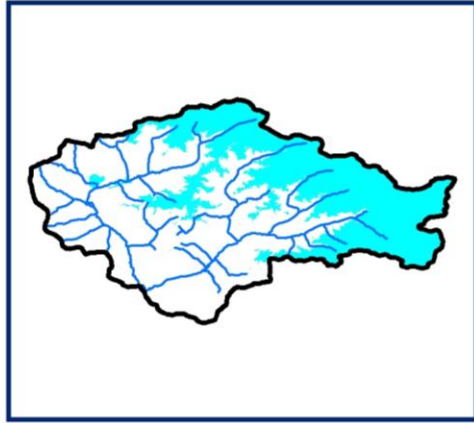


**SNOW COVER MAP**

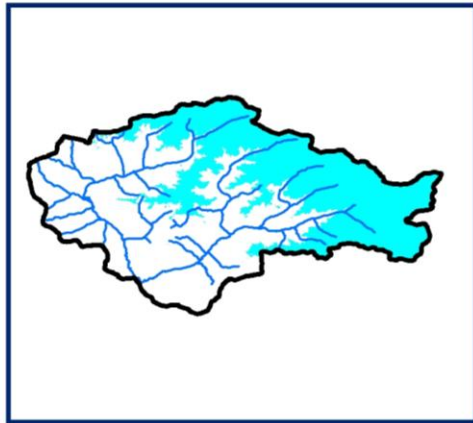
**: YAMUNA BASIN**



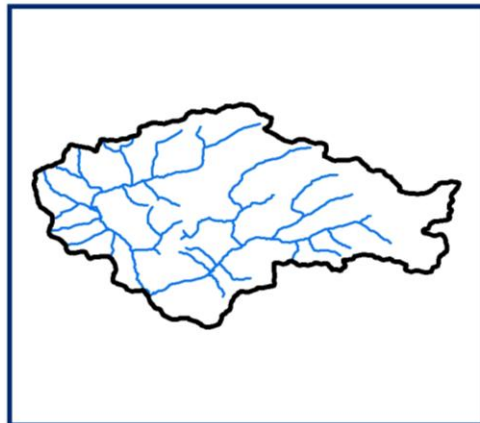
**02 APRIL 2014**



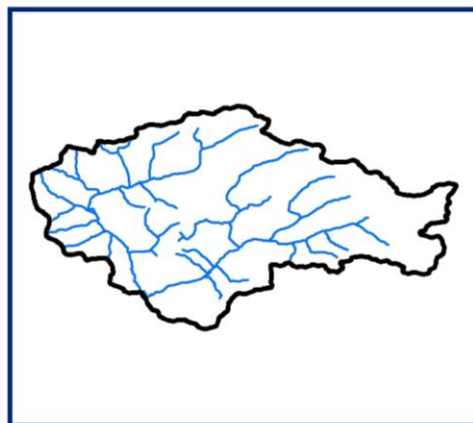
**10 APRIL 2014**



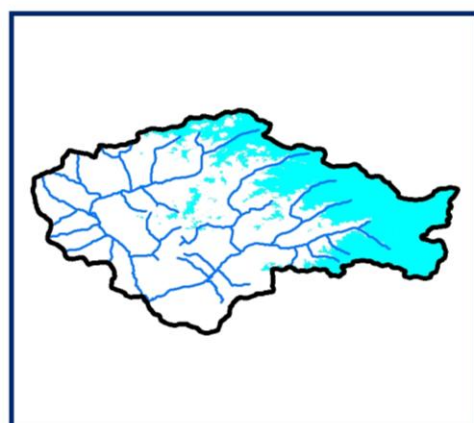
**14 APRIL 2014**



**DATA NOT AVILABLE**



**DATA NOT AVILABLE**



**26 APRIL 2014**



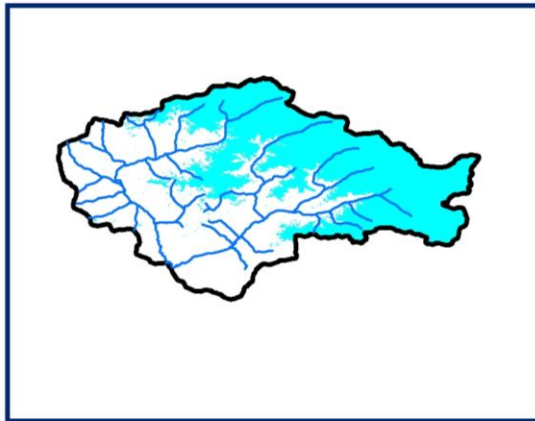
**SNOW**

0 12.5 25 50 75 100



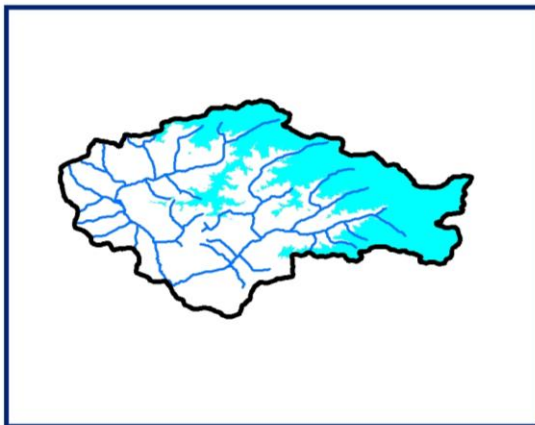
**Kilometers**

# 10 DAILY SNOW COVER MAP: YAMUNA BASIN

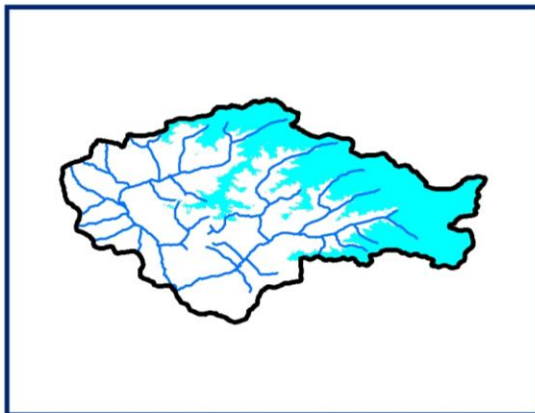


**DATA USED**

**05 APRIL 2014**



**16 APRIL 2014**



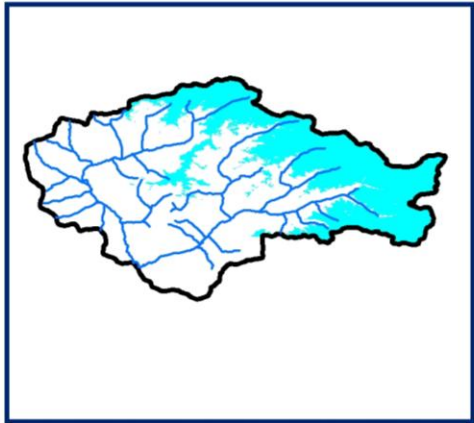
**28 APRIL 2014**

 SNOW

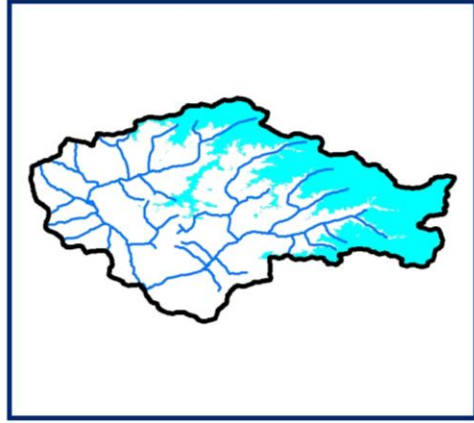
0 12.5 25 50 75 100  
Kilometers

**SNOW COVER MAP**

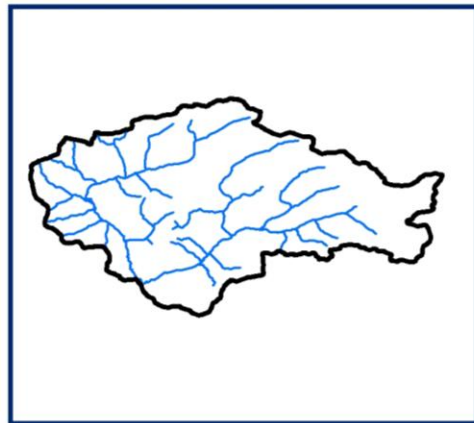
**: YAMUNA BASIN**



**01 MAY 2014**



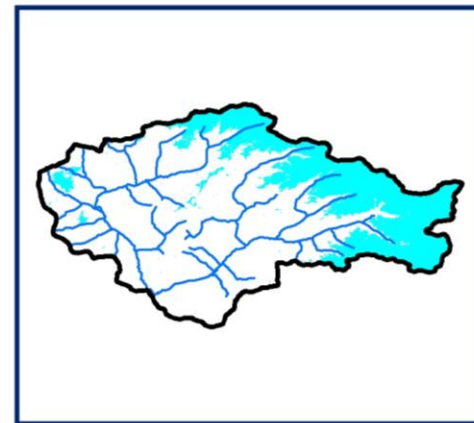
**08 MAY 2014**



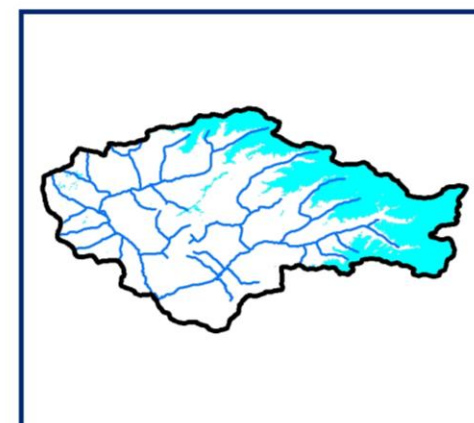
**DATA NOT AVILABLE**



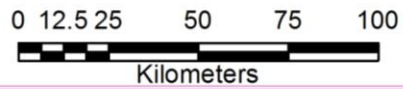
**18 MAY 2014**



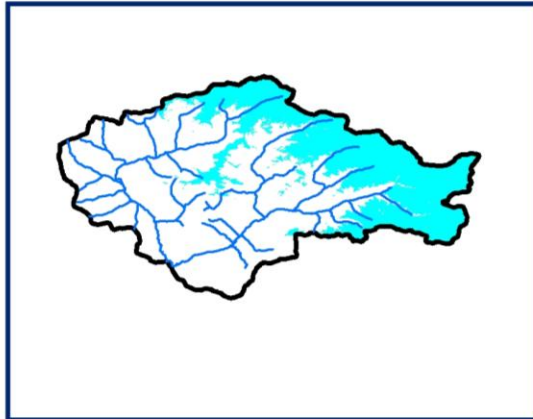
**25 MAY 2014**



**28 MAY 2014**

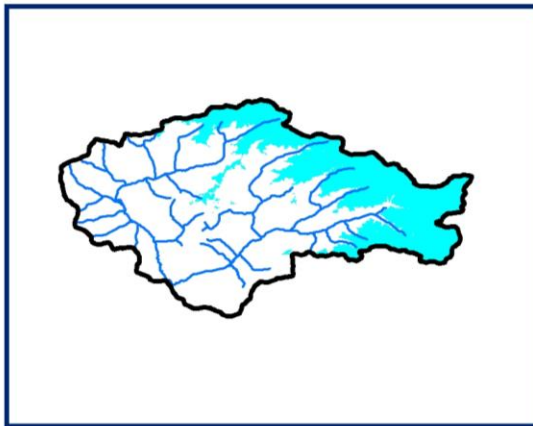


**10 DAILY SNOW COVER MAP: YAMUNA BASIN**

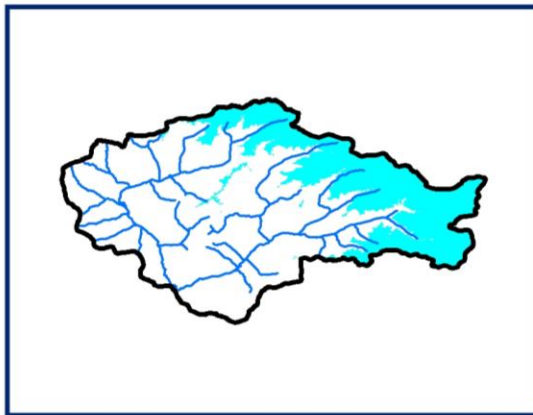


**DATA USED**

**01 MAY 2014**




**16 MAY 2014**



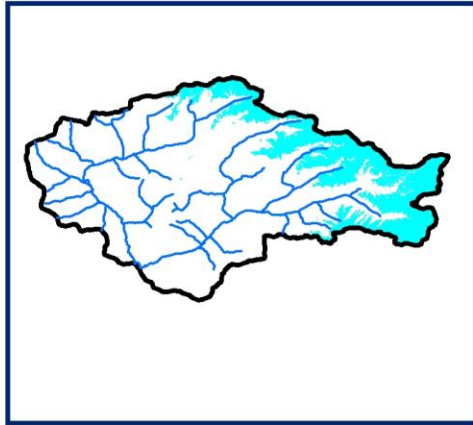
**28 MAY 2014**

 SNOW

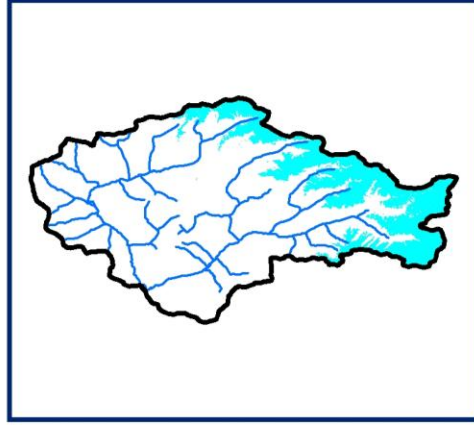
0 12.5 25 50 75 100  
 Kilometers

**SNOW COVER MAP**

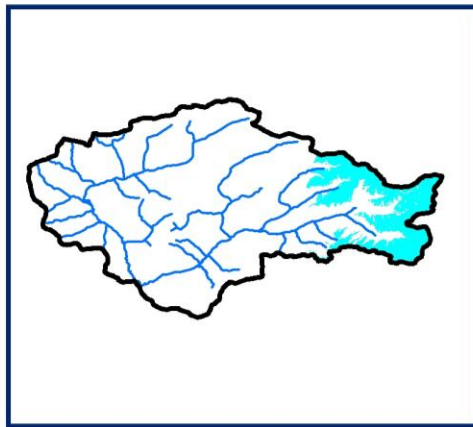
**: YAMUNA BASIN**



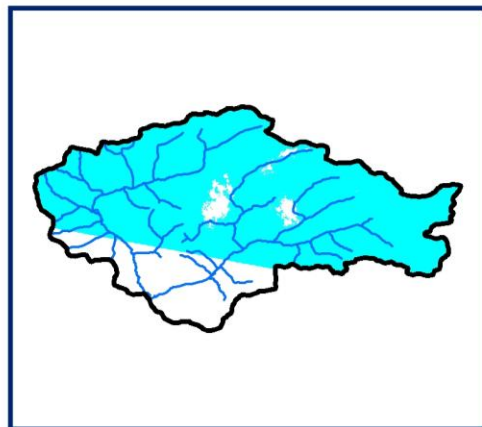
**04 JUNE 2014**



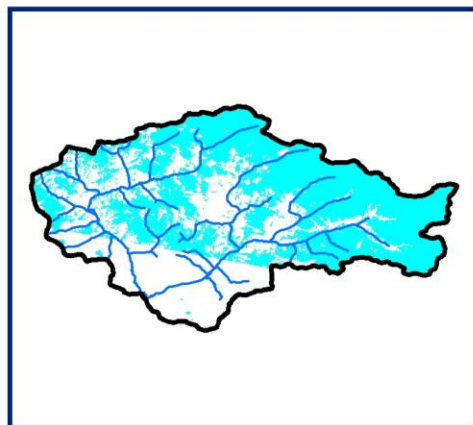
**09 JUNE 2014**



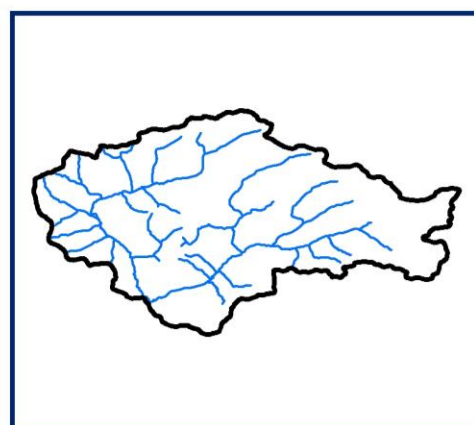
**14 JUNE 2014**



**16 JUNE 2014**



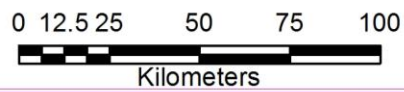
**25 JUNE 2014**



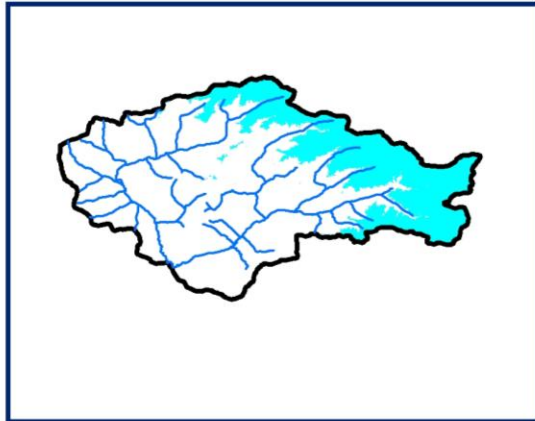
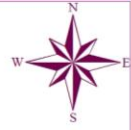
**DATA NOT AVAILABLE**



SNOW

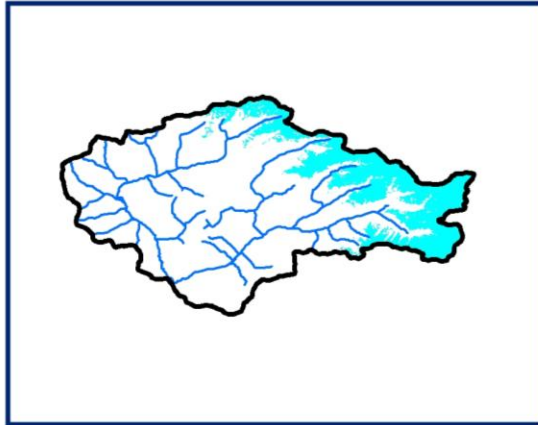


**10 DAILY SNOW COVER MAP: YAMUNA BASIN**

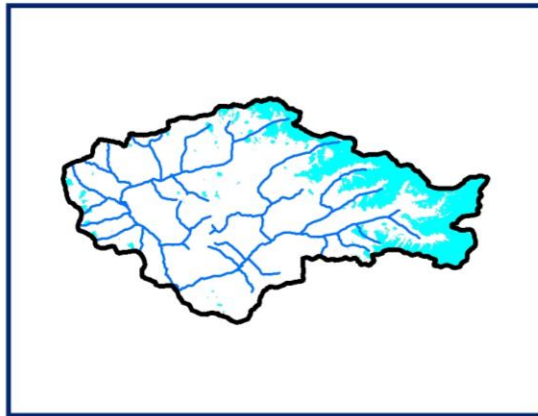


**DATA USED**

**06 JUNE 2014**



**13 JUNE 2014**



**25 JUNE 2014**



**SNOW**

0 12.5 25 50 75 100  
Kilometers