

Using Maps for Sustainable Development - A Feedback from User in Uttarakhand.

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ABSTRACT

Departments of the State of Uttarakhand which prominently use toposheets and maps provided by the Survey of India are mainly the departments which were created almost immediately after Survey of India was created during the British Rule in India. These are Revenue, Forest, PWD, Irrigation dept. etc. Other departments, which joined the list later, are Soil conservation, Agriculture dept, Disaster Mitigation deptt. etc. Some maps having a small portion of disputed international boundary are denied for supply by Survey of India. The policy for making maps available to development agencies of State Govt. like Uttarakhand when majority area falls within the 'Secret' and 'Restricted' terrain, needs to be reviewed today.

The various departments of State government, record informations on toposheets, maps and sketches in a haphazard fashion and that too in a limited way that a state level overview of development and planning can not be immediately made by compiling the maps of various departments.

The slogan to include the use of Map Culture in planning and design of development activities by state departments needs to be facilitated by corresponding changes in Laws and Rules governing the access and availability of correct Maps in India.

The author in his paper has given a vivid feedback as an user of maps of Uttarakhand. He has also made an appeal for making digital data of maps available in a format compatible to ArcInfo Software. He has suggested making an Atlas for Uttarakhand which has two sections, one for layman and other for development planners which provides contours and features for the user to add large amount of attribute data to point, line and polygon features.

I am privileged to have an opportunity to work in the northern Indian state where the Head offices and the drawing boards of Survey of India (SOI) are situated. I get occasions to see the bust of Pandit Brothers in campus of SOI and get motivation to go on long exploratory walks seeking more information about my environment. The celebration of 200 years of the Great Arc inspires me to take a peep beyond my limited horizon seeking new vistas of ideas and natural resources to further improve the quality of life of the people I serve.

The departments of state of Uttarakhand which prominently uses the toposheets and maps provided by the SOI are mainly the departments which were created almost immediately after SOI was created during the British Rule of India. These are Revenue, Forest, PWD, Irrigation Department. Other departments on this list of users are Soil Conservation Wing of Agriculture Department and Disaster Mitigation Department. Almost all offices of these departments have toposheets of the territory for which they are responsible. The village interfacing functionary of these departments uses maps in day to day functioning. However, certain toposheets which have been denied by SOI on grounds of non availability at SOI are not available with the new offices of these departments. It is coincident that these 'not available' toposheets are either the

ones which include disputed International Border segments or are out of print. If a small sector of international border is disputed, then why the topographical map of the remaining area in the said toposheet is denied for development activity, perhaps needs to be reviewed. Also, how can the sole authorised provider of maps of India be out of stock? It may be worthwhile to review the need of change in policy for making available maps to development agencies of state government like Uttarakhand whose majority area falls within the 'secret' and 'restricted' territory which were defined many a decades ago in very different circumstances than that which prevail today.

Majority of the other development departments like Rural Development, DRDA, Minor Irrigation, Energy, Electricity, Drinking Water, The Extension Wing of Agriculture Department, Horticulture, Animal Husbandry, Tourism, Health, Education Department make sparing use of any kind of good Maps, not to speak of SOI toposheets in day to day decision making and planning. The decisions are made mostly on tabulated data and a small scale map is affixed with reports to depict the general location of the area under consideration. It is my personal knowledge that a young officer of these departments does make his first attempt to procure SOI toposheets of his

Project area and his experience is that instead of being made available the required toposheet he is expected to fulfil filling of Forms to be signed by more than one senior officer. And the signatory is expected to give undertaking of safekeeping of a map in which he, the signatory, is not interested because the signatory is of a very senior level whereas the actual toposheet will be used by junior field officers. Thus the day to day works of these many state departments does not make use of Maps, not to speak of toposheets. The best word which can describe what they use is a 'Sketch'. The bottom line is that many development departments do not use maps which can depict information which can be transformed to another map.

The departments that do use toposheets then make other maps on different themes which are sometimes based on the toposheets of SOI and sometimes not. The Revenue department makes cadastral maps by their own survey. Forest Department makes maps of Forest Management, Forest area types by taking the help of SOI. Watershed Management Directorate makes maps of Watershed areas, slope, elevation and different thematic maps using SOI topo sheet as base maps. Urban Development Local bodies make their own survey for large scale mapping. Organizations executing big civil construction works make their own survey to produce large scale maps of Project area. The various departments of state government record information on toposheets, maps and sketches in a haphazard fashion and that too in a limited way that a state level overview of development and planning can not be immediately made by compiling the maps of various departments.

SOI has schemes and projects to cater to different requirements of different users. There are private enterprises waiting in the wings to provide service in field surveys and map making. All of us gathered for the 23rd INCA International Congress feel that there is something amiss in the use of maps in the development activities by the state departments. The slogan to include the use of Map Culture in planning and design of development activities by state departments needs to be facilitated by corresponding changes in Laws and Rules governing the access and availability of correct Maps in India. The believers in status quo in old Laws, formulated during an era when Empires expanded by travel by then superior sail ships and who required secrecy of their maps from prying eyes of other competing predated Empires, need not read further. The best product of SOI is the two dimensional toposheet of 1:50,000 scale which is an information power pack and available for all parts of the country. Starting from this product I share my experience with the view to give a feedback from a user of map in Uttaranchal.

1. SOI Maps are not updated for decades. The main feature which stands out sore is the transportation network. The other good and useful information in the toposheet is left unseen and unused because many a potential user loses interest in the map because he can not easily pin point his location on the map by taking his bearing with reference to one of the easily recognizable landmarks namely roads. To inculcate Map Culture in development of state the Maps themselves have to be updated. Who will update the map? Who will bear the cost of updation of map ? These questions have to be answered by the organisation having the single and sole responsibility of providing maps of the country.
2. The SOI maps on 1:50,000 scale are very convenient to keep records of the location wherein any development works have been done or are proposed to be undertaken. The contour interval of 20 M is sufficient to design alignment of roads (though information of geology is not available). However, the contour interval of 20 M has been found totally inadequate for designing of small water channel for irrigation and sometimes for pipelines of water supply, which results in avoidable situations of water supply constructions where the head of intake channel is not sufficiently higher than the tail of intake channel and water flow does not take place as desired. For mountainous areas the contours need to be mapped with smaller interval. This is an important requirement which will require large scale work on part of the cartography community.
3. This creates a necessity of development of a methodology to provide larger scale maps and smaller contour intervals for planning and design of civil works. The question to be addressed is, which organization will make these large scale maps - will it be SOI or the organization which requires the maps? In both the situations it will be the new generation cartographers who will make the new map.
4. Cadastral Maps are required to be in the same scale for all rural habitations in the state. At present the cadastral maps are mainly made by revenue department in two different scales namely; 1 inch to 4 miles and other one is 1 inch

to 2 miles. All of the cadastral maps are very old and because the then land survey was done by iron chains, the recorded dimensions are not accurate. If land reforms are to be successfully completed, then there is dire necessity of re-survey and remaking of cadastral maps for each habitation in the state. Participation and role of SOI in making a new generation of cadastral maps for the Uttaranchal State may be discussed during this conference.

5. Thematic maps on subjects like Soil, Geology, Hydrology, Forest types, Minerals, Natural resources at a standard scale like 1:50,000 scale are not easily available for the state. In most instances this kind of vital information is available on small scale of a million or a quarter million. And for the state of Uttaranchal there is an added hurdle of Map sheets belonging to the secret and restricted category which inhibit the organization having these maps to freely transfer the information to Government and Non Government users in Uttaranchal.
6. The record keeping practice of the secret and restricted numbered toposheets entail personal accountability of the incumbent in office in case of loss of toposheet. This threat of potential damage to the career and personal life by violating the law of the country creates fear and inhibition in the mind of user which results in the incumbent keeping all kind of maps under lock and key and opening the lock only once a year at the time of annual physical verification regarding the safe keeping of secret and restricted maps. To my mind this is the second most inhibiting factor in the use of toposheets and maps in the state government. The first inhibiting factor being non easy availability of toposheets and maps useful to government officers.
7. The day after WGS 84 format maps will be available for all to procure without the fear of breaking the law by loosing the map sheet, how will we be certain that the map use culture will change and planning of development activity will make use of information available on maps. The easiest way to motivate and inculcate habit of using maps is to make the map a useful friend for the user. The simplest motivation tool is self

steam. When the user will see his project/work on updated maps, he will be motivated to make use of maps for project design and development because he will know that his output is on the map for all to see and not restricted in files of his superior officer. Here I refer to use of Web GIS sites of different departments wherein each department updates its development works and all state departments use same projection system which will make easy adding of information of different departments.

8. The fastest technique to update the maps will have to rely largely on remote sensing techniques. And the cost of updating maps based on remote sensing techniques will have to be decreased either by substantially increasing the total number of buyers or by developing methodologies which provide for updation without remaking the full map.
9. By shifting from paper base maps to digital maps a large amount of attribute data regarding the socio-economic status, natural resources, disaster mitigation plans can be available to users. The development towards digital maps will be a task demanding higher degree of concentration and quality control. Watershed Management Directorate has experienced certain difficulties in making use of digital toposheets provided by SOI. It took two years of request to Ministry of Defence and Ministry of External Affairs to get permission for procurement. After submission of indent to SOI it took another one year to get the delivery of digital data of six toposheets on 1:50,000 scale.

The SOI was requested to provide the digital data in a format compatible to ArcInfo software. The problems encountered in using the Digital Data of 1:50,000 scale provided by SOI were:

- Black layer** (1) Area features and line features both are categorised as Arc feature. This is misleading and confusing. Area features should be categorised as polygon.
- (2) Stream lines are broken at many places. Streamlines also have too many undershoots and overshoots. This creates additional work for user of first correcting them and then make stream network.

(3) Black layer includes point features. Whereas the point features should be in a separate layer not cluttered up with polygons and arcs. Point feature should be kept in separate layer

Blue Layer (1) Perennial stream lines are broken. Streamlines must be in continuation.

(2) A part of the stream is included in Blue layer and a part of the same stream is included in Black Layer.

(3) Forest area border are in Green layer and Administrative borders are in Black layer. This is inconvenient to keep track of. All landuse type, area type features should be in a single polygon layer which will ensure that a piece of land is not classified twice.

Contours are broken at many places and merged with each other at many other places. This is undesirable in making models and calculations requiring contours. Contours should be clean, continuous with the height of that contour attached as attribute of line.

Red Layer : Transportation lines are in very poor condition. They are broken in too many places which is not suitable for making Road network. It creates situation where extrapolation of roads has to be made by user and thus creates scope for generating erroneous maps which gets circulated in use in the user organization.

Transportation network should be updated by recent satellite data (image) or by traverse using GPS.

It is requested to provide the following layers as different separate coverage.

- i. Contour (Line type)
- ii. River / Drainage line (both perennial and non perennial), canal (Line type),

- iii. Tanks, Wells and small water bodies as point features.
- iv. Transportation network (Line type)
- v. Landuse i.e. forest, agriculture, habitation etc. (Polygon)
- vi. Villages (Points)
- vii. Administrative boundaries (Line type)
- viii. Spot height (Point type)
- ix. Text (Annotations)

10. In the endeavour to develop integrated GIS and MIS from village level upto state level, indent has been made to SOI, after obtaining no objection from Ministry of Defence to provide digital data of all toposheets covering the Uttaranchal state on 1:50,000 scale. It is planned to link the village wise census of India data in GIS. Steps have been initiated to obtain geocoded satellite imagery in the same scale. The RS data will be used to derive different thematic maps. The help of Govt. of India Institutions having expertise in remote sensing interpretation will be requested.

But the moot question remains as to how we inculcate the use of map culture in the offices in the state government to make use of available information on map for planning and completion of development works. To make wide-spread use of maps for sustainable development planning and operation I propose that the maps be made more interesting and user friendly and easily available. This is easily possible by making digital maps. An example will be Microsoft Encarta World Atlas. The cartographers of country can make a similar and better map for Uttaranchal which has two different sections; one for the layman and other for the development planners which provides contours and features for the user to add large amount of attribute data to point, line and polygon features..