

Jal Chitra: Water Map

Software for Rural Water Management

VIKRAM VYAS

"The village will have its own waterworks, ensuring clean water supply. This can be done through controlled wells or tanks."

M.K. Gandhi, *Harijan* 26 July 1942

The problem of meeting the water needs of a rural community is a complex problem. There is no doubt that in solving this problem IT can potentially play a useful role, but how to harness this potentiality is a question that has not received the attention it deserves. For example, a reasonable first step in a strategy for drought-proofing a village is to have an estimate of the amount of water that is reliably available to the village in a given month and to compare it with the water requirement of the village in that month. Quantifying the water deficiency in a given month and then estimating the cost of developing water sources to bridge this gap, perhaps through building rainwater-harvesting systems, or through recharging existing wells, and sharing this information with the larger village community could start the process of drought-proofing a village. Similarly, as is well known, often the question is not simply of the availability of water but of access to it. A very clear picture of the water situation in a village emerges if all the functioning water sources are shown on a community map of the village. These are just examples, there are many other detailed questions whose answer can be of much value to the community as it plans its water resources, but these are the questions that only the community itself can articulate and IT based tools should respond to them.

The first attempt at such a tool was the development of a mathematical model for determining the reliability of rainwater harvesting systems with covered tanks against recurrent droughts. In 1997 this model was converted into an easy to use free software, Sim-Tanka. The original plan was to continue to develop various similar models, like a model for rainwater harvesting systems with open water reservoirs – Sim-Talab; a model for estimating the yield from wells and tube wells – Sim-Well; and then to integrate them in a unified model of various water sources available to a rural community.

A serious risk in the use of IT for rural development is that it can become a case of solutions seeking problems. The development of Sim-Tanka suffered to an extent from this pitfall. Sim-Tanka was developed with the intention of helping a rural community design a reliable rainwater harvesting system using past rainfall data. In a technical sense the software is very useful, but a community does not approach its water resources in a piecemeal manner; it does not think in terms of optimised rainwater harvesting systems working in isolation. Thus while Sim-Tanka was received positively by many IT practitioners, and received a fair amount of positive publicity, its actual use in building rainwater harvesting systems has been insignificant.

The development of Jal-Chitra started with the recognition of this failure. More specifically it was the reluctance of the Barefoot College, Tilonia, to use Sim-Tanka in their programme of constructing rainwater harvesting systems that initiated the process of trying to understand what kind of information and analysis is truly useful to a rural community. The long development period of Jal-Chitra, which has now extended over more than three years, has been a continuous debate, discussion and dialogue to answer this question.

The result of this debate was recognition that there are three sets of information that can assist a *Panchyat* in managing its water sources:

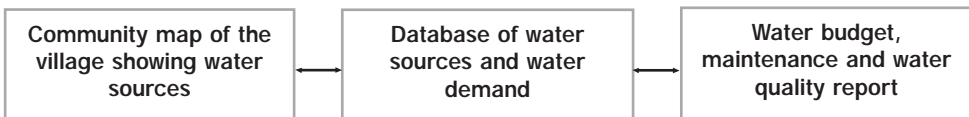
An estimate of the monthly water budget of the village;

A way of keeping track of the maintenance work required for the various water sources;

A community based water resource map of the village with information about access to water.

Further, to ensure transparency and accountability all this information has to be available to the entire village in Hindi.

The defining feature of Jal-Chitra is its ability to allow a user to draw a community based water resource map of the village; further, by clicking on any of these sources the user can enter information about the amount of water available from that source, the details of any maintenance activity in that month and, if available, it also keeps record of the water quality test. The information so entered is then used to generate monthly water budgets, and various maintenance and water quality reports. These reports are in Hindi and can be printed and shared with the village at large.



Conceptual Outline of Jal-Chitra

Jal-Chitra at a Glance

1. Uses Hindi as the language for interacting with the user.
2. Allows users to draw interactive community based water resource maps of the village.
3. Allows the community to keep a monthly record of the amount of water available from each of the water sources.
4. Has a facility for keeping records of water quality testing.

5. Has a facility for keeping records of maintenance work required and the maintenance work that has been done.
6. Estimates the water demand for domestic, livestock, and agriculture uses.
7. The farm records also suggest the optimal water irrigation required depending on the crop planted and the amount of rainfall.
8. Generates future monthly water budgets based on past records; as more monthly records are kept the corresponding estimates become more reliable.
9. Informs the community as to how much of its annual water need is being met from underground water and the approximate amount of recharging that is taking place.
10. Finds out the reliability of covered rainwater harvesting systems.
11. Estimates the amount of rainwater harvesting done by a village and compares it with the total potentiality of rainwater harvesting in the given village.

Who Will Use Jal-Chitra?

Since the aim of Jal-Chitra is to provide a tool for the village community, it naturally raises the question how will the various rural communities access Jal-Chitra? The tentative answer that has emerged from the testing of Jal-Chitra at Barefoot College, Tilonia, and with the Mazdoor Kisan Shakti Sangathan (MKSS), Devdungari, is that two kinds of institutions have to be involved. Firstly, voluntary organisations that are working directly with the village *Panchayats* and have access to a computer. Their role is that of an intermediary and one that will change once *Panchayats* themselves have access to computers.

Secondly, and perhaps most importantly, the village school has to be involved in the use of Jal-Chitra. The minimum information that Jal-Chitra needs to be useful is the monthly record of the amount of water available from various sources. This requires recording the discharge rate of handpumps, the area of water cover in the rainwater reservoir, the average depth of water in the reservoirs. For more advanced use, it also requires maintaining meteorological records like that of rainfall. The village children can do these activities, together with the exercise of making the village map. Apart from facilitating the use of Jal-Chitra, this has the potential of making the education of a child living in village more engaging and rooted to her or his environment.

Testing Jal-Chitra

Since January 2002 Jal-Chitra is being used in more than a dozen villages of Rajasthan. Its use in these villages roughly follows the following steps:

1. First a rough community map of the village is drawn on a paper.
2. A survey of all water sources is conducted.
3. A survey of the village is conducted to determine the approximate human and livestock population.
4. Water sources are then marked on the paper map.
5. The village community map showing all the water sources is then drawn on the computer using Jal-Chitra.
6. Information about each of the water sources is then connected with the map of the village in Jal-Chitra.

7. Every month all the water sources are surveyed to determine if they are functioning or not, the kind of repairs required and the approximate amount of water being withdrawn from each of the sources.

Using this information Jal-Chitra generates the following monthly reports:

- >A monthly water budget of the village.
- >A maintenance report, indicating water sources that require some form of maintenance.
- >A maintenance log of every water source in the village, showing all the repair works done on that source.

It is planned that these reports will be shared with the village community during the *Gram-Sabha*. To make full utilisation of all the tools incorporated in Jal-Chitra requires a basic hydro-geological survey of the village and an incorporation of the monthly meteorological records. Unfortunately, in the village where Jal-Chitra is currently being tested, this information is missing. Incorporation of these records and an independent validation of the monthly water budget generated by Jal-Chitra are some of the pressing tasks.

For the testing of Jal-Chitra in Silora Panchayat, the collection of the monthly information is the responsibility of a worker of Barefoot College, Tilonia, who has graduated from its night school. Ms. Lalita, who had formal education till lower high school and does not know any English, records the collected information in Jal-Chitra. Some of the reports generated during the course of this testing are included below as computer screen shots. The testing of Jal-Chitra in Todgadh is of particular importance as it is being done in a manner

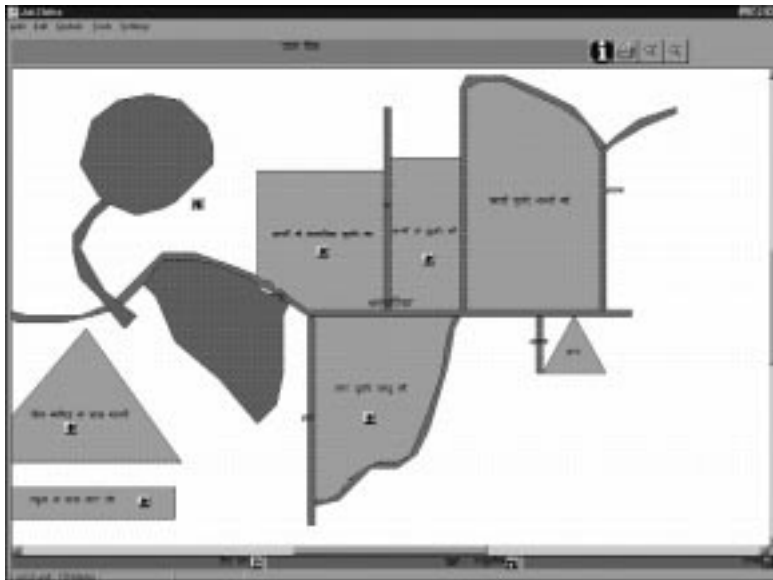


Figure 4 Schematic Community Water Resource Map of Kacharia Drawn by Ms. Lalita of the Barefoot College, Tilonia.

close to its envisioned mode of usage. The high school students collect the monthly data of the amount of water available from various water sources and Vivek Ramkumar, a member of MKSS, then enters the information into Jal-Chitra on his laptop computer. Further, another member of MKSS, Tejaram, is the head of the Todgadh *Panchayat* and can therefore potentially use the analysis coming from Jal-Chitra in the *Panchayat's* development plan.

Future of Jal-Chitra

Even the limited use of Jal-Chitra has validated the basic premise behind its development. For example, the records of handpump maintenance and their maintenance log are vividly bringing out the water situation in various villages. Once these reports are shared with the whole of the village through *Gram-Sabha* then, hopefully, one will be able to see the use of Jal-Chitra as an advocacy tool.

There are still many questions whose answers will emerge only after a more extended use of Jal-Chitra. One particularly important issue that has to be understood is how should *Panchayats* use the monthly water budget generated by Jal-Chitra in its planning and water management exercise.

The development and the use of Jal-Chitra has suggested two related projects. Firstly, there is a need to document the experience of developing, testing and using Jal-Chitra so that the lessons learned from this work can be analysed and shared with the wider community. Secondly, based on the testing of Jal-Chitra and through a continuous dialogue with the members of various *Panchayats* where Jal-Chitra is being used, the development of a new version has to begin. It is hoped that the future development of Jal-Chitra will take place within the paradigm of open and free software so that users, software developers and planners from all over the world can collaborate in its continuous development.

Jal-Chitra is a result of collaboration between the Ajit Foundation, Jaipur, and Barefoot College, Tilonia. I am grateful to my colleagues at both these organisations. At the Barefoot College I am particularly grateful to Ms. Lalita for her insistence on the Hindi version of Jal-Chitra and for her diligent testing of it. I am also grateful to Vivek Ramkumar of the MKSS and to the students of Todgadh High School who have been involved in the testing of Jal-Chitra in Todgadh.

My views on the use of information technology for rural development have been greatly influenced by my conversations with Bunker Roy, Dr. Kamla Chowdhary, Laxman Singh, Prof. Narendra Singhi, Nikhil Dey and Prof. Vijay Vyas. I would like to thank them all for sharing their insights with me.

Jal-Chitra is free software meant for *Panchayats* and voluntary organisations working with them. To obtain a copy of Jal-Chitra please contact: The Ajit Foundation, 396 Vasundhara Colony, Jaipur – 302 018, India.