03

PLAYBOOK

Best practices from rural livelihood projects supported by Axis Bank Foundation

RURAL LIVELIHOOD

WATER MANAGEMENT

Community-led Water Management

Part 3 - Water Budgeting

What need does the playbook address?

Large swaths of the country are facing severe water stress, largely due to over-exploitation of groundwater and surface water resources. Lower water availability leads to unequal distribution of water resources, lower crop yields during dry months, and issues of salinity and aridity of the soil. Addressing this issue requires community participation and behavioral change.

Rather than designing top-down schemes for agrarian water use, DSC emphasizes on community planning of water resources. The design of field assessments, community mobilisation, village-level water budgets, water recharge structures, monitoring and the participatory approach to water security planning best exemplify this.

Who can use this playbook?

Practitioners, Trainers, Community Resource Persons, Progressive Farmers, Subject Matter Specialists, Local Governance Representatives

This playbook is designed using the expertise of **Development Support Centre (DSC)**, which works on participatory water management and judicious use of water in Gujarat, Madhya Pradesh, Rajasthan and Maharashtra.

These solutions by DSC have been designed and pioneered under the leadership of Anil Shah, founder chairman; Mohan Sharma, executive director; and Sachin Oza, former executive director. These community-empowering participatory technical and social processes in DSC`s 30-year journey led to the evolution of the approach to promoting community-led water security.

Today we have gathered to talk about the water situation in our village. Let's see how deep is the water.

Did any of you notice that the soil is getting arid because water is saline?

How many of you had lower crop yields in this dry season?

Did some of you feel you received less water than your neighbouring regions?

If we manage our water properly we can solve these problems of irregular water supply and quality

In this book you'll learn to

- Understand your village's water needs and resources
- Get involved in water management
- Prepare water budgets
- Plan for water security
- Replenish groundwater by building recharge shafts
- Monitor water resources
- Cooperatively manage irrigation

** This playbook is **Part 3** of a 7-part playbook series on cooperative water management. Find the complete set here: link*

3.

Water Budgeting

The first step is to calculate our water supply and water needs to get an idea of the deficit that we need to plan for

Why should we do water budgeting? Let me explain.

- *Water budgeting helps in **increasing awareness** of water needs in a village, by creating a baseline of water supply and demand in the village*
- *Water budgets can help in facilitating proposals to **attract developmental projects** through CSR, philanthropic initiatives, government aid, etc.*
- *A thorough assessment of water helps in **framing conservation initiatives***

When should we be doing it?

*The best time to do the water budgeting exercise is about two months before the annual panchayat plans are made. This way, any solution that arises from the discussion can be incorporated in the panchayat budgets for the year. Best time to make the budgets is between **February to June**, right after winter season. Water budgeting should be done every year.*

How much time does it take to do the exercise?

*On average, it can take **15 days to 1 month** to develop a water budget and present it to the committee. Hand-holding and mentoring of Jal Saathi through data collection and calculation phase is recommended.*

How do we get started?

Water budgeting is done in three steps:

1. ***Collecting Data***
2. ***Calculating Supply***
3. ***Calculating Demand***

The Jal Saathi plays a crucial role in this activity

1. COLLECTING DATA

Jal Saathi goes around the village collecting the data below:

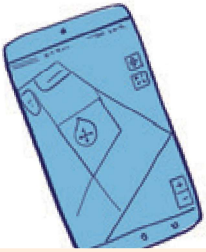
- Village inventory of tube-wells, bore-wells, open wells, ponds, check dams, recharge shafts
- Village demographic information
- Tabulating water sources

VILLAGE INVENTORY DATA

At a bore-well...

How deep did you drill that borewell? And do you get water throughout the year?

At a pond, using the Field Measurement App...



How deep is that pond and how many months of the year does it have water?

Hmm, if the pond is 10 feet in depth (3m), and my app is showing an area of 2.93 ha (29,300 sq.m.), then the volume of water it stores is around 8.79 lakh litres.

VILLAGE DEMOGRAPHIC DATA

At the Village Industry...

What is your annual water consumption for the year?

At the Panchayat Office...

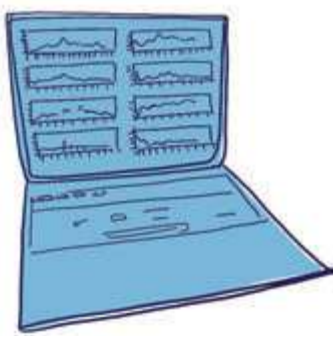
Can you give me information on population, size of the village, crops sown, area of sowing, number of households, types of land?

At the Animal husbandry...

How many livestocks do we have in the village? What kind of livestock do they own?

WATER RESOURCES DATA

At the Indian Meteorological department...



Indian Meteorological Dept. has annual rainfall data for upto 10 years for the region

At the Irrigation department...

How much water has been released into the minor canal in our village this year?

2. CALCULATING WATER SUPPLY

Jal Saathi presents, at the village committee meeting

After nearly one month of gathering data, I can present to you my findings. Let us start off with **water supply.**

Rainfall last year

750mm

Size of our village

1,072 hect

Total Water received = 750 x 1072

= 8,04,000 cubic meters *or*

16,08,000 tankers*

Now let us look at where does this water go

45%	20%	25%	10%
is lost to evaporation	runs off from our village in streams	is absorbed by the soil	seeps through the soil and recharges our groundwater

If you look at this, it is clear that the water we can use in the village is whatever is absorbed by the soil and what is recharged. Which means, we can use

4,02,000 + 1,60,800 = 5,62,800 tankers

25% *of* 16,08,000 + 10% *of* 16,08,000

** 1 tanker = 5000 litres of water, read explanation for more details.*

We have **two ponds**, so let us calculate how much water is stored in each.

First pond is of an area of 0.22 hectare. It's depth is around 4 feet. But since water is not full in this pond throughout the year, we will consider the average capacity of 60% or, around 2.4 feet (which is 730mm). So our pond can store:

$$0.22 \text{ ha} \times 730 \text{ mm} \times 2^{*} = 351 \text{ tankers}$$

Similarly, the second pond stores: 236 tankers. We will add this to the water we get from the rain. So, in total, the village can get...

5.63 lakh tankers

** Read explanation*

Explanation for the calculations

CONVERTING TO TANKERS

For easy understanding, all volume measurements should be converted to tankers. In this case, DSC assumes 5000L per tanker, which is the most common form of water tanker in Gujarat. If the units for area is in hectares and for water is in litre (or mm when rainfall is measured), then, one has to multiple by 2 to get volume in tankers. e.g:

750 mm * 1,072 (ha) or 0.750 m * 1,07,20,000 sq.m. = 80,40,000 cubic meter

1 cubic meter = 1,000 litres & 1 tank = 5,000 litres. So, 1 cubic meters = 0.2 tanks

80,40,000 cubic meters = 16,08,000 tankers.

EVAPORATION AND OTHER LOSSES

This varies from region to region and should be calculated using secondary research. For instance, in hilly regions, 50% can be run-off, while less than 10% will be absorbed by the soil. These assumptions, research and calculation should be done by the technical staff in an organisation and then communicated to the *Jal Saathi* (Community Resource Person). In Gujarat, where DSC works, the soil is porous. Soil moisture absorption and recharge potential is very high here.

3. CALCULATING WATER DEMAND

Jal Saathi continues to present water demand to the committee..

Now, we'll calculate how much water **we need**

1. HOUSEHOLD

We have 3,770 people in the village, and each person consumes average of 80 litres of water daily.

3770 × 80 × 365 = 11,00,84,000 litres

If we have to divide this into 5,000 litres tankers, then we need 22,016 tankers of water.

2. INDUSTRY

We have three small scale industries and dairies. My enquiries show that they take holiday for just 2 days a year.

1st 270 litres × 363 = 98,010 litres 19.602 tankers

2nd 100 litres × 363 = 363000 litres 7.26 tankers

3rd 80 litres × 363 = 29040 litres 5.9 tankers

3. LIVESTOCK

The census of livestock was taken from the veterinary doctor in the village. Here, I have shown how much water is needed for each animal:

LIVESTOCK	WATER NEEDED PER DAY (LITRES)	TOTAL NO. OF ANIMALS	TOTAL REQUIREMENT. (LITRES)
Cow	50	806	40,300
Bull	60	625	37,500
Bullock	30	15	450
Horse	25	2	50
Camel	40	4	160
Goat	6	127	762
Total	**211**		**79,222**

Overall, our livestock need 79,222 litres per day.
For one year, we need 2.89 lakh litres *or* 5,783 tankers

Explanation for the calculations

HOUSEHOLD WATER DEMAND

For the number used by DSC is 80 litres, but this changes in regions. It could be less than 70 litres (in water stressed regions) to above 130 litres (in more prosperous regions).

Household surveys where water usage patterns are observed can give an approximate consumption of water.

LIVESTOCK WATER DEMAND

This again, depends on region, type of breed and animal husbandry practices. DSC makes these assumptions based on research by agriculture and veterinary researchers in Gujarat. A thorough literature review by technical team or subject matter experts can bring out approximate values of daily water consumption for different types of livestock. This information can be procured from the veterinary department and experts in other areas.

Now, we'll calculate how much water we need for **agriculture.** I have taken this information from the agriculture department and the gram panchayat. Here, we have a list of all crops in Kharif, Rabi and Zaid seasons, the approximate hectare that it is sown in, and water requirements in each hectare

CROP	HECTARES SOWN	WATER NEEDED PER HECTARE (litres per hectare as per Gujarat govt standard calculations)*	TOTAL WATER REQT. (L)	TOTAL WATER REQT. (M^3)
		KHARIF		
Cotton	100	500	50000	50
Castor	145	500	72,500	72.5
Vegetables	25	620	15,500	15.5
Fodder	50	350	17,500	17.5
		RABI		
Wheat	165	520	85,800	85.8
Mustard	70	350	24,500	24.5
Tobacco	2	630	1260	1.26
Vegetable	23	620	14,260	14.26
Potato	5	400	2000	2
		ZAID		
Bajra	70	650	45,500	45.5
Fodder	15	650	9,750	9.75
Jowar	30	650	18,500	18.5

As you can see, our calculations show that we need 7.41 lakh tankers of water just for agriculture. If we add household and livestock demand, we need at least 7.68 lakh tankers of water

**This data is available with all agricultural universities, KVKs, and agriculture dept. in your area*

Explanation for the calculations

AREA OF CROP SOWN

Through experience, DSC has found that there is often a mismatch between actual crop sowing area in a village and what is recorded by the agriculture department. It is good practice to verify the area of sowing through village committees.

AGRICULTURE WATER DEMAND

The water demand for crops and farmland varies widely between regions, and even between villages. It is dependent on soil types and farming methods. The kinds of seed varieties grown, use of pesticides and fertilisers, soil moisture content also play a role.

The calculations for crops and water use can be obtained through research by local state agriculture universities.

In subsequent years, *Bhujal Jankaars* and *Jal Saathis* can be trained in using flowmeters to calculate the water usage per season for a crop in selected farmlands in his village.

Jal Saathi concludes..

As you can see, our village receives around 5.63 lakh tankers of water every year; while, the demand is around 7.68 lakh tankers. This means we are ***falling short of 2.05 lakh tankers*** of water.

This tells us that we are over-exploiting the precious groundwater reserves available in our village!

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Supported by

AXIS BANK FOUNDATION

November 2025