WATER SUPPLY SYSTEMS IN NEPAL

HOW TO BUILD BETTER, MORE SUSTAINABLE SERVICES

OXFAM

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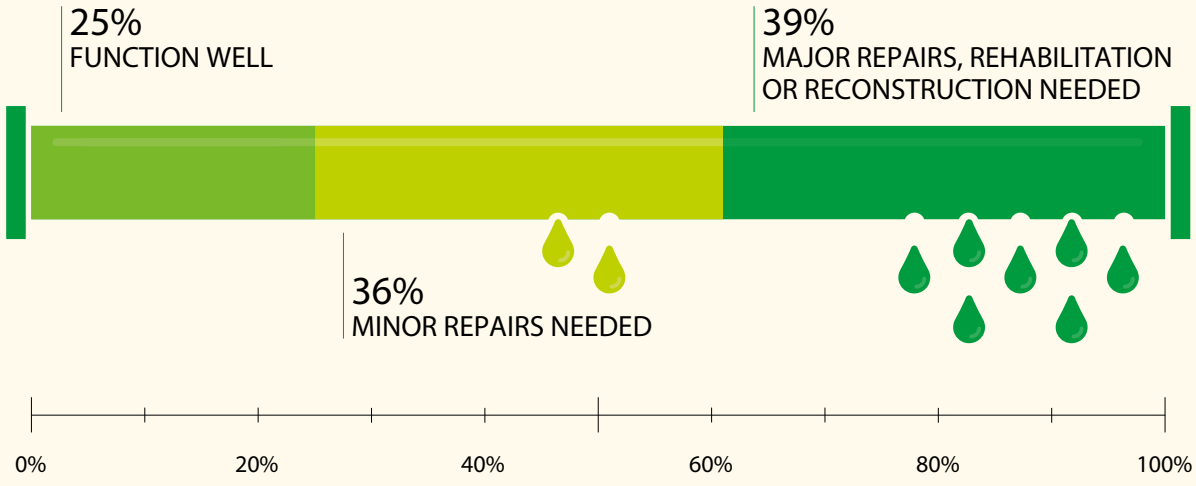
Water supply systems in Nepal
HOW TO BUILD BETTER, MORE SUSTAINABLE SERVICES

CONDITION OF WATER SYSTEMS IN NEPAL



In Nepal, only 25% of water supply schemes are functioning well. 36% need minor repairs and 39% need major repairs, rehabilitation or reconstruction. [1]

While there are several approaches to setting up schemes, there is only one model of ongoing service management – community-based management through local water user committees. This is applied everywhere, from small rural systems to small town systems.

Research has shown that these committees are often unable to operate schemes sustainably. This is because they typically struggle to collect enough money through tariffs, don't have the technical capacity to carry out maintenance, and lack accountability or transparency.

Oxfam, international consultant LeFil Consulting and Nepali enterprise SmartPaani set out to explore alternative models while rehabilitating or rebuilding 200 schemes in the Hills districts and implementing two new schemes in the Terai.

We surveyed the condition of water supply schemes in these two regions (mostly gravity-flow systems in the Hills and systems where water is pumped from underground, stored in a tank and distributed using gravity in the Terai), collecting quantitative and qualitative data on technical, financial, governance and social factors affecting sustainability across 26 schemes. We then built a financial model (profit/loss statement) of a 'typical' scheme in the Hills and the Terai, based on (limited) available data, to assess the impact of these factors on profitability, and therefore sustainability.

[1] GOVERNMENT OF NEPAL (2016) NEPAL WATER SUPPLY, SANITATION AND HYGIENE SECTOR DEVELOPMENT PLAN (2015–30).

FINANCIAL DIFFICULTIES MAKING SCHEMES UNSUSTAINABLE

Water supply schemes in the Hills and Terai were struggling to be financially sustainable because they were collecting insufficient tariffs to cover the cost of operation and breakdowns.

In the Hills, schemes were managing to almost break-even, as the technology used was simple and easy to repair. But in the case of a landslide or earthquake, there was no money to rehabilitate or reconstruct the scheme.

In the Terai, although some schemes appeared to be profitable on an annual basis, most operated at a loss (equal to few thousand US dollars per year) over a 10-year period, when taking into account system replacement costs.

8 out of 10 schemes visited had problems with pipes or pumps, and an average of 30% of their expenses were spent on these repairs. Another 50% of their operations and maintenance budget was spent on staffing and office operation costs.

Many people were unwilling to pay even a minimum fee for a service that took too long to be connected and was unreliable when set up. In the Terai, the rate at which households started paying for a connection once the system was up and running (the adoption curve) was very poor. This seriously affected the income of schemes.

FINANCIAL MODEL OF 'TYPICAL' SCHEMES IN THE HILLS AND TERAI (USD)[2]

	HILLS	TERAI
Average number of households	118	655
REVENUES		
Per cent collected	54%	72%
Number of paying households	64	471
Current tariff (per year)	3.85	11
Gaupalika 'investments'	1,749	9,666
Interest revenues	34	187
Total revenues per year	**2,029**	**15,081**
OPERATIONS AND MAINTENANCE COSTS		
Electricity	0	2,960
Technician salaries	493	1,140
Guard salaries	134	982
Accountant salaries	-	857
Water user committee salaries	-	363
Meter reader salaries	75	377
Office expenses	143	986
Pipe repairs/tank repairs	598	1,841
Pipe cleaning/tank cleaning	97	430
Interest payments	-	-
Total operations and maintenance per year	**1,538**	**9,937**
Net after operations and maintenance	**491**	**5,144**
CAPITAL REPAIRS		
Pump replacement	15	2,145
Pipe replacement	-	2,494
Meter replacement	-	1,134
Electrical system replacement	-	2,050
Other repairs	-	917
Total captial repairs	**15**	**8,740**
Net profit	**476.30**	**(3,596.06)**

[2] NOTE: GAUPALIKAS' INVESTMENTS IN THE HILLS ARE MOSTLY TO COVER REPAIRS, WHILE IN THE TERAI THEY ARE MORE OFTEN USED TO EXPAND THE SYSTEM AS WELL AS COVER REPAIRS. GAUPALIKAS' INVESTMENTS IN THE TERAI ARE OVER A LONGER PERIOD DUE TO THE HIGH CONSTRUCTION COSTS OF THE MORE COMPLEX SYSTEMS NEEDED.

TESTING 'LEVERS' TO IMPROVE SUSTAINABILITY

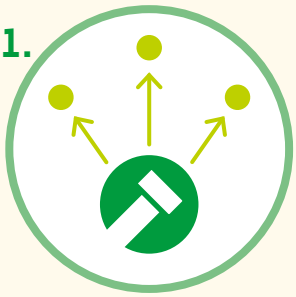
Based on this data, we carried out a sensitivity analysis to estimate the impact of various 'levers' on the profitability, and therefore sustainability, of rural water supply schemes (see graph on p6).

We focused on levers that could not just improve but transform the current water supply delivery system.

The aim was to boost effectiveness and efficiency of water service delivery through alternative management models. Private sector partners would provide services cost-effectively at scale to the local Gaupalika, financed by a more systematic approach to tariff collection and annual funding.

SUSTAINABILITY LEVERS

L1.



OUTSOURCE PIPE LAYING TO LOCAL PROFESSIONALS

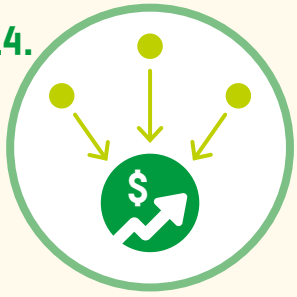
L2.

ENSURE 80% OF THE POPULATION HAS PAID FOR A HOUSEHOLD WATER CONNECTION BEFORE THE WATER SYSTEM IS CONSTRUCTED

L3.

AUTOMATE BILLING FROM MOBILE PHONE CREDIT OR PRE-PAID CARDS

L4.



CENTRALISE AND OUTSOURCE THE MANAGEMENT OF FINANCIAL ACCOUNTS

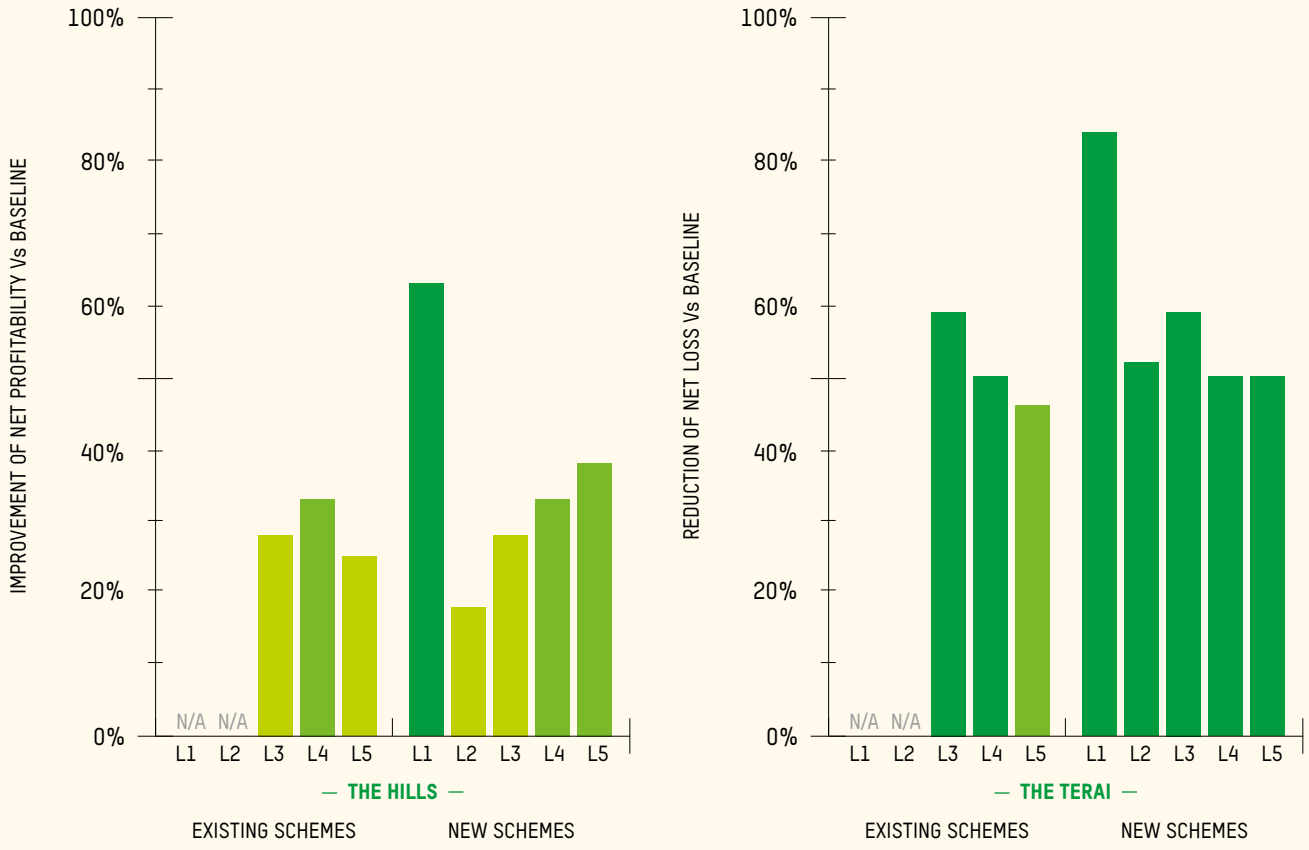
L5.

OUTSOURCE OPERATIONS AND MAINTENANCE TO LOCAL PROFESSIONALS

IMPROVEMENT IN PROFITABILITY AND REDUCTION IN LOSSES FOR EACH LEVER IN FOUR 'TYPICAL' SCHEMES

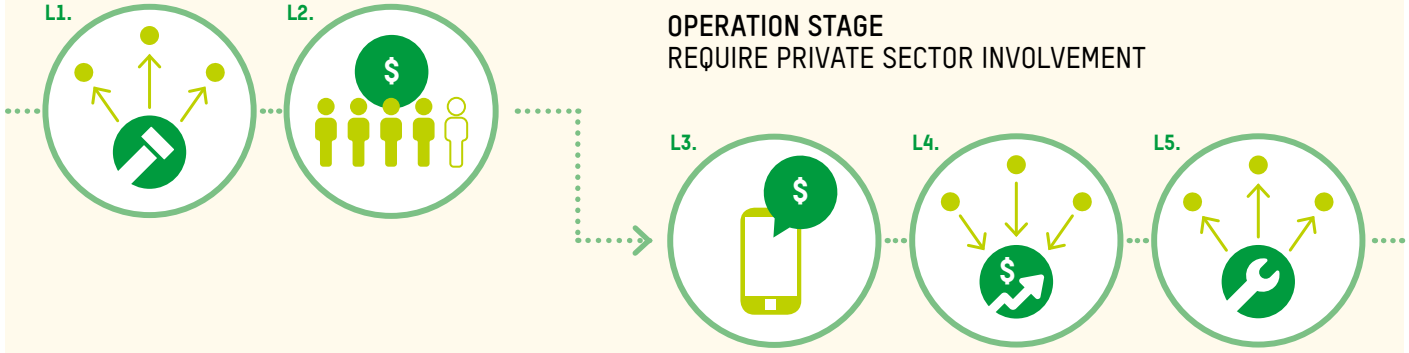
LEVERS SENSITIVITY TO THE PROFITABILTY OF A SCHEME

HIGH MODERATE LOW



WHEN TO IMPLEMENT THE LEVERS

IMPLEMENTATION STAGE
DO NOT REQUIRE PRIVATE SECTOR INVOLVEMENT



OPERATION STAGE
REQUIRE PRIVATE SECTOR INVOLVEMENT

L1.
OUTSOURCE PIPE LAYING TO LOCAL PROFESSIONALS

Water pipes are often not installed at the recommended depth or properly joined together. This means the pipes frequently need repairing, reducing the reliability of the service and increasing costs.

Moving from involving the community in pipe laying to recruiting professionals could improve profitability by 63% in new schemes in the Hills and reduce losses by 84% in new schemes in the Terai.

This new approach could be quickly adopted by NGOs. Communities would still be involved in decision-making and would contribute to the scheme through paying household connection fees (see lever 2).

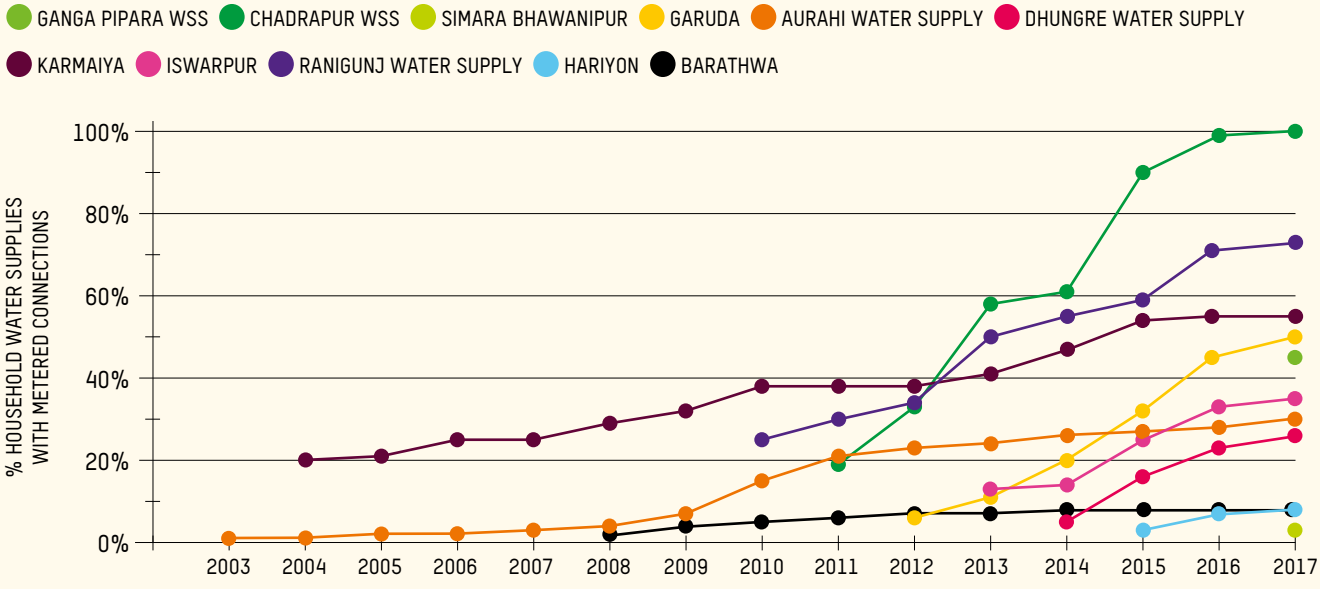
L2.
ENSURE 80% OF THE POPULATION HAS PAID FOR A HOUSEHOLD WATER CONNECTION BEFORE THE WATER SYSTEM IS CONSTRUCTED

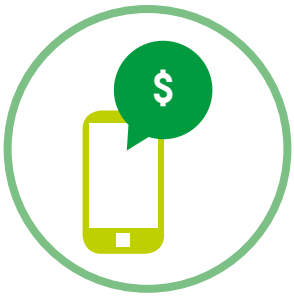
The 'adoption curve' (the rate at which households start paying for a connection once a system is up and running) has a big impact on schemes' sustainability. Steeper adoption curves (more households paying for a connection in the first year) means the scheme is more likely to be financially sustainable.

To achieve this, the implementing agency must collect payment for household connections upfront from at least 80% of households in the area. To motivate households to pay upfront, the service provider could offer incentives such as discounts for early buyers, payment-in-instalment options, and subsidised connections for those unable to pay the full connection fee.

This lever could improve the profitability of a new scheme by 18% in the Hills and reduce losses in new schemes in the Terai by 52%.

ADOPTION CURVE OF WATER SUPPLY SCHEMES





L3.
AUTOMATE BILLING FROM MOBILE PHONE CREDIT OR PRE-PAID CARDS

Automated billing can increase the frequency and consistency of payments, which are currently low across schemes. Instead of someone reading a household's meter and giving them a bill they have to pay at a cooperative far from home, the household can pay automatically through their mobile phone credit and/or pre-paid cards (mobile or satellite TV).

This method of payment is already being used by phone and TV companies, even in rural areas. We discussed this opportunity with Ncell (telco), Namaste (telco) and Dish Home (satellite TV company) which are already using this technology. They would be interested in applying it to water supply schemes if some of the development costs could be subsidised. This new approach also requires upfront investment, for example, setting up a system of 'cataloguing' each user with a unique ID.

This lever could increase the profitability of both new and existing schemes in the Hills by 28% and decrease losses in the Terai by 59%. It would dramatically increase the feasibility of lever 4 – Centralise and outsource the management of financial accounts – by bringing data from multiple schemes together on a single platform.

L4.
CENTRALISE AND OUTSOURCE THE MANAGEMENT OF FINANCIAL ACCOUNTS

Moving from a local person with limited capacity and resources managing a scheme's financial accounts to professional management could improve the quality of financial management and ensure good governance and transparency. This approach could also reduce admin costs (salaries, office space, miscellaneous 'running costs') which are on average 50% of a scheme's annual expenditure.

Managing finances centrally would provide schemes with the best possible deals, in terms of interest-bearing accounts, instead of having to contract multiple local financial cooperatives. It would make it easier for Gaupalikas to see which of its schemes had issues, which might require subsidies, and how much it could allocate to the development of a new scheme. This lever could increase the profitability of new and existing schemes in the Hills by 33% and decrease losses by 50% in the Terai.

Some questions and considerations:

- Is there a financial organisation that could use technology to manage and oversee bundles of accounts, both incoming tariffs and expenditures?
- Is there a way to sign 'bulk contracts' directly with the Gaupalikas, to move all 'their' schemes to this new system?
- How best to standardise tariff structures and allowed expenditures (for example, guards' salaries, water committee stipends, local operator payments) for maximum automation (for instance, schemes categorised from small/simple to large/complex and tariffs and expenditures set for each level)?

- How best to approve and pay for maintenance and repairs (ideally through the Gaupalika), allowing the account manager to pay the service provider directly, once the job has been performed satisfactorily?
- What to do when the balance is (close to) negative (for example, prioritising expenses, unlocking Gaupalika investments, or enforcing tariff compliance)?

We discussed this opportunity with Nepal Agricultural Co-operative Central Federation Ltd (NACCFL), a financial cooperative, eSewa – a financial service platform provider, and Prabhu Management – a financial services company operating through cooperative agents and shop agents. They responded positively but asked for more information before committing to the idea.

Meeting local water users to promote the importance of securing paid household connections before the system is built.

L5.
OUTSOURCE OPERATIONS AND MAINTENANCE TO LOCAL PROFESSIONALS

Instead of having an individual technician in every scheme, this would mean identifying, vetting and managing a pool of plumbers (especially for the Hills, where gravity-fed technology is more common) and/or skilled technicians at reasonable distances from schemes. This would help schemes save money, as frequent, professional maintenance typically translates into lower repair costs over time (especially for costly repairs) – for instance, a pump will have a longer life if properly maintained and repaired early and pipes will leak less.

The ideal situation would be to work with one (or a group of) private sector companies with an established network of professionals whose skills match the schemes' needs.

This lever could increase profitability in the Hills by 38% for new schemes and 25% for existing schemes, and reduce losses in the Terai by 50% for new schemes and 46% for existing schemes.

We were not able to identify a big company to implement this lever, but we did identify a start-up company, HomeSewa, as a potential partner to manage this service as part of Nepal plumbers' association. The solution could potentially be a competitive process among a pool of dedicated technicians (using an Uber-like platform), or outsourcing maintenance to one organisation managing a pool of technicians and servicing infrastructure for a set fee per cluster of schemes.

HOW TO IMPLEMENT THE LEVERS

The role of Oxfam and other NGOs interested in piloting these levers is of facilitator: finding areas where they could be rolled out, influencing government, enrolling authorities and partners, collaborating with service providers, identifying funding, helping incubate new stakeholders, and tracking progress and challenges. Gaupalikas bear the ultimate responsibility for water systems and need to invest in them accordingly. As the objective of this work is to support them to deliver safe water in a more sustainable and cost-effective way, they are the most important stakeholder in the development of a new model.

In discussions, Gaupalikas were enthusiastic about the opportunity to:

- Minimise headaches from broken schemes.
- Save money to build new schemes (and fund other priorities).
- Get better visibility on needs and priorities.
- Position themselves as progressive and transparent leaders in their constituencies.

They highlighted the need to keep Gaupalika jobs (for example, technicians) and find a meaningful role for their staff to play (for example, in approving or receiving the works), as they could not be seen to outsource jobs to the private sector. It is important to stress the objective is to determine if the private sector can support the public sector to deliver services more effectively and efficiently, and within the existing regulatory framework, not to replace the public sector.

It is crucial to consider at what scale the levers would need to be implemented to adequately assess their viability and effectiveness. To justify investing in any of the levers, a minimum number of Gaupalikas should be enrolled from the start.

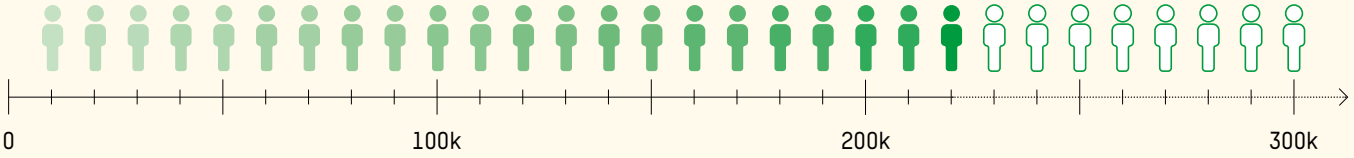
Given that a Gaupalika in the Hills oversees an average of 35 schemes, while a Gaupalika in the Terai oversees an average of two schemes, we estimate that (based on 70% enrollment in each case) at least 11 Gaupalikas need to be involved in the Hills and 11 in the Terai (a total of 407 schemes and 220,000 people in total) to create enough revenues to pay for an account management company (lever 4) or technician network operator (lever 5), for instance.

These calculations assume that half of the savings made by outsourcing maintenance work could be channelled into paying for the platform or account manager (while the other 50% remained with the schemes). This would generate 3,600 USD per month to pay for the platform or account manager, on top of the fees paid to technicians who would be deployed over dozens of schemes (on which, the platform manager could also make a margin). A technician in the Hills would be paid 1,372 USD per year and a technician in the Terai 3,696 USD.

This is quite a jump in terms of size of the typical NGO pilot, and would require significant investment in a system that works almost exclusively to develop governance and financial management with very little investment in infrastructure.

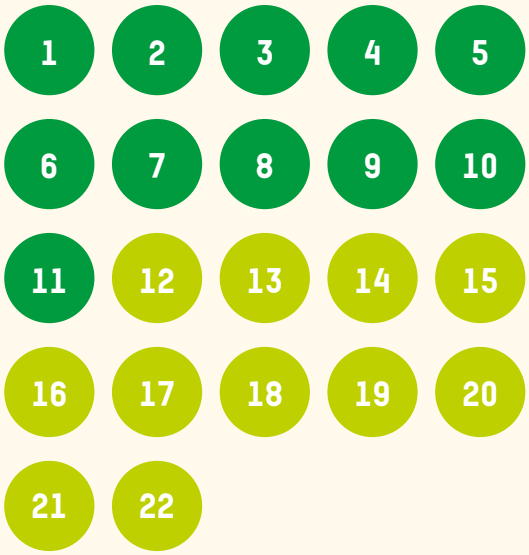
ESTIMATE OF MINIMUM GAUPALIKA SIGN-UP REQUIRED TO MAKE LEVERS FOUR OR FIVE VIABLE

TOTAL NUMBER OF PEOPLE NEEDED **220,000**

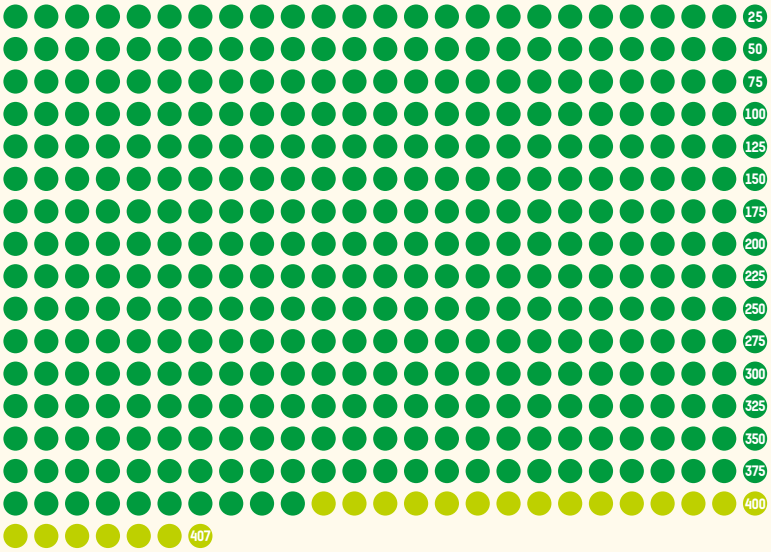


THE HILLS THE TERAI

TOTAL NUMBER OF GAUPALIKAS NEEDED **22**



TOTAL NUMBER OF SCHEMES NEEDED **407**



WHAT NEXT?

OXFAM PLANS TO DEVELOP AND TEST THESE LEVERS, TOGETHER WITH DISTRICT STAFF. WE ARE AIMING TO DEVELOP A NATIONAL MULTI-STAKEHOLDER COALITION IN NEPAL TO ADOPT THESE FINDINGS AND IMPLEMENT THEM CONSISTENTLY AND COLLABORATIVELY AT SCALE. OUR ULTIMATE GOAL IS TO IMPROVE THE SUSTAINABILITY OF WATER SUPPLY SCHEMES ACROSS NEPAL.

WANT TO GET INVOLVED IN THIS GROUND-BREAKING PROJECT?

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Photo: © Oxfam in Nepal

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