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Essay on Development Policy

# Operation and maintenance in community managed rural drinking water supply systems

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# 1 Introduction

This essay deliberates the viability of the community management approach for operation and maintenance of drinking water supply systems in rural areas of low-income countries.

Chapter 2 entails a short review of the current literature on community managed water supply systems, compiles the associated shortcomings and summarises the recommendations to move towards more sustainable service models.

Chapter 3 analyses the technical and operational status of water supply schemes of the Water Resources Management Programme of HELVETAS Nepal, which are operated under a slightly adapted community based service provider model. The results are compared with outcomes of conventionally operated schemes.

Chapter 4 compares the findings from literature with the analysis of the pilot schemes in Nepal, draws conclusions on the viability of the new approach and discusses possible modifications.

# 2 Development of the community management approach

## 1.1 Origins and history of the approach

Over the last decades, community management has become the default approach for rural water supply in many low and middle-income countries (Hutchings et al., 2015). Confronted with weak local governance and failing public service provision, many development actors hand over management of rural infrastructure facilities to the community.

Harvey and Redd (2007) summarize the development of community management as the prevalent management model of rural water supply in development countries. It established itself as the front-runner during the 1980s UN International Decade for Drinking Water and Sanitation as a reaction to largely failed government service delivery efforts. It is based on the three main principles that (i) communities should participate in the development of water supply schemes, (ii) take ownership of them and finally (iii) take on the responsibility to carry out operation and maintenance (O&M) of the system. Part of its success is owed to the appeal of these principles to many stakeholders: NGOs and bi-lateral organisations could integrate such a model straight into their project cycles while governments could absolve themselves from O&M duties. Underlying these principles were contemporary - somewhat idealistic and often unchallenged - assumptions on rural communities such as a high degree of community cohesion or their willingness and ability to volunteer to manage these technical systems (RWSN, 2010).

Critics state, that this original community management model remained mostly “supply driven” until the 1990s and was in this respect rather similar to the forgoing public service provision efforts (Harvey

and Reed, 2007). The village's institutional capacity or willingness to take on O&M tasks were regularly ignored, with the primary focus lying on the provision of infrastructure. Consequently, the communities often played only a rather minor role in these water supply projects (Hutchings et al., 2015). This flaw was supposedly addressed in the late 1990s, when the World Bank started to promote the demand-responsive approach (DRA) which complemented and further reinforced the community management approach. DRA aimed to ensure that the offered water supply level matched the (economic) demand of the community, namely its willingness (i) to contribute to construction costs (usually about 10%), (ii) to get involved in technology choice and (iii) to assume responsibility for the systems O&M (World Bank, 1998). In the following years, the combination of community management and DRA became the default approach for the provision of water supply in rural areas in many low and middle-income countries.

## 1.2 Successes and failures

In many cases, this modality proved to be successful in providing first-time access to water supply services. The fraction of rural people worldwide having access to an improved water source increased by 20% (62% to 82%) from 1990 to 2012 (WHO/UNICEF, 2014). This increase in access was accompanied by an improvement in service supply level, i.e. 29% of rural people had a private water connection, i.e. a piped water supply to their premises in 2012 (WHO/UNICEF, 2014) compared to 18% in 1990. Moriarty et al. (2013) argues that the historical increase in service levels is at least partly owed to global drivers such as urbanisation, economic growth and poverty reduction, which all result in an augmented demand for higher levels of service. On the surface level, and while only looking at macro numbers of water supply, this blending of the community management approach and DRA could be judged as a resounding success.

However, the approach also brings about challenges in setting up sustainable operation and maintenance frameworks to keep the facilities functional over their whole potential lifetime. While the gap is closing for first time access, numerous studies highlight that community managed rural water supply systems in developing countries become non-functional ahead of time (e.g. Baumann, 2006). The numbers vary across countries and technologies but on average 20% to 40% of water points in low-income countries are not functioning as designed (Improve International, 2016). Faced with high infrastructure failure rates, rural community members then often have to revert to unsafe water sources.

Multiple reasons have been brought forward for these functionality failures. Discrepancies between demanded and supplied service level are often identified as one of the culprits for infrastructure

breakdowns (Moriarty et al., 2013). The users' economic demand, that is their ability and willingness to pay for a certain service, does not necessarily match the supplied service level: the users may be able and willing to pay for more or less, than what is actually supplied. On the one hand, users may not be willing to pay for very basic water supply infrastructure (e.g. hand pumps or community water taps, which are shared among multiple households) and desire higher service levels such as household connections or increased quantities of supplied water to enable agricultural production (e.g. Van Houweling et al., 2012). As a result, users may not be willing to contribute (financially or by labour) to the upkeep of such basic services or enhance them through self-supply initiatives (Butterworth, 2013). On the other hand, poor households may not be in the position to pay for the most basic services and are thus unable to maintain hardware, which would fulfil minimum supply standards. This latter point often leaves governments, development actors and local service provides with the dilemma of whether to provide services at a supply level that meets minimum acceptable norms, or to supply services at lower levels for which the communities are willing and able to pay (Moriarty et al., 2013).

In any event, if there is too big a deviation between supplied and demanded service level, it will inevitably threaten the schemes long-term sustainability, as it is unlikely that the community is either willing or able to maintain it over longer periods. Even though the DRA is supposedly to tailor the supplied service to the effective demand of the community, in reality things are often not as straightforward. Demand can be highly variable across and within communities (Schouten and Moriarty, 2013). Particularly for poor communities, other factors than the actual (economic) demand may inform the supplied service level, i.e. the momentum to achieve the MDG goals and the pressure for services to meet minimum health and human rights based criteria, often lead development actors to disregard what the communities are able to financially sustain over the long-term (Moriarty et al., 2013).

Irrespective of the provided supply level, rural communities in low-income countries often struggle with operation and maintenance tasks that go beyond day-to-day business such as financial management, succession planning or asset replacement (Harvey and Reed, 2007; Bakalian and Wakeman, 2009). Numerous studies highlight that many community based service providers are not able manage their water systems sustainably without external support of some sort (e.g. Harvey and Reed, 2007). Rural communities in low-income countries are usually not endowed with the financial resources to contribute meaningfully to the upkeep of water supply systems. At the same time they often cannot rely on governmental support, be it in the form of grants, loans or other funding to maintain the water supply infrastructure or in the form of advisory services and capacity building to improve the quality of operations, maintenance and administration (Hutchings et al., 2015).

Accordingly, if the communities are left on their own, the water systems often begin to fail once large-scale investments for major repair or rehabilitation works are required. The institutional challenge of setting and enforcing effective O&M policies is even bigger for larger and more complex systems, which puts the scalability of the approach into question (Bolt et al., 2001).

While sustainability issues have been discussed in the WASH community since quite some time, the pressure to extended coverage and the relative ease to spend budget and demonstrate impacts while providing first time access pose strong incentives to building hardware instead of focusing on the more challenging elements of management, operation and maintenance. The fact that financing in the sector often comes in the form of investment programmes with a duration of 4 - 5 years further contributes to the pattern where development agencies hand over O&M solely to the community (Montangero, 2015).

A more nuanced analysis, which looks beyond the success stories of enabling first time access, thus also entails the challenges concerning long-term functionality of the systems. On the account of these difficulties, development scholars have reflected on the limits of what community management can realistically accomplish, given that it is an approach relying on informality and voluntarism (Moriarty et al., 2013).

## 1.3 Evolution of the approach

With this realisation, development actors began to look more closely into success factors of community managed systems and started to adapt and modify their approach. A common denominator among these modifications was a change in philosophy where external agencies no longer hand over infrastructure to the communities to then simply disappear towards a more mutual approach where communities receive ongoing institutional support by the state, development agencies or private entities. Different names were coined for this evolution such as a move to “external support”, “post-construction support” or “community management plus (CM+)” (Schouten and Moriarty, 2003; Baumann, 2006). Concurrently, development actors started to differentiate approaches of community management more closely in accordance to the needs and capabilities of the communities as well as the capacity of the enabling environment to provide the support. Smits et al. (2015) developed a framework, which divides community management models into the three broad categories shown in Figure 1:

- Communities with higher average income are more likely to pay significant user fees for O&M thus allowing community management entities to move away from voluntary arrangements towards more professional service provision (Professional Community-Based Management in Figure 1).

Outsourcing some of the operation and maintenance tasks to professional third party service providers relive community councils from taking care of the day-to-day O&M business. At the same time, professional service providers can be made more accountable for their work than voluntary councils. Local governmental institutions may still play an important role in this model by building capacity and monitoring the performance of the service providers.

- On the other hand, communities with low incomes in fragile environments usually have less capacity to contribute to the systems O&M. Preferably, the community members are involved in key decisions but cannot be expected to assume the main responsibility for the systems O&M. This requires the presence of governmental entities or other external actors like development agencies with the capacity and the resources to facilitate direct provision to the community (Direct provision with Community Involvement in Figure 1).
- In between, there are communities, which are in a position to take on operation, maintenance and management duties as well as contributing modest user fees (Community Management Plus in Figure 1). In contrast to the other two forms, where communities mainly have an oversight and decision-making role, here significant community commitment is required in terms of community members volunteering time to carry out the bulk of the O&M tasks. The willingness and capability of community members to assume the voluntary tasks is thus of vital importance for this model to succeed. In addition, post-construction support from external agencies is needed to support and sustain the community efforts over the long-term (i.e. the "plus" in community management).

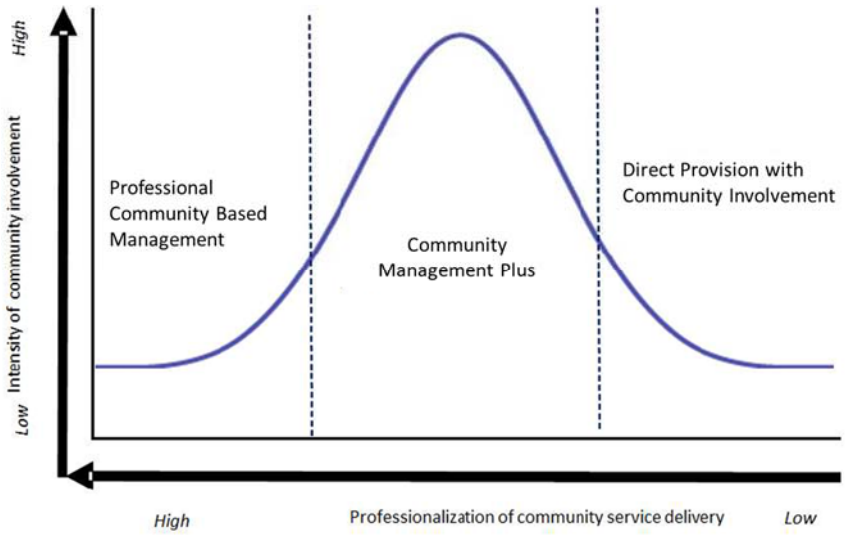


*Figure 1: Anticipated level of community participation for different forms of community management (adapted from Smits et al., 2015).*

When looking at the above categories a key takeaway for community-managed systems is the need to account for different degrees of community involvement and external support. Hutchings et al. (2015)

suggest, that the capacity of the community to take on responsibility for O&M as well as the capacity of environment to provide external support is directly related to the prevailing socio-economic wealth in a society. In other words, it is futile to look for a one-size fits all solution. Instead, local context should inform the choice and shape the form of the selected management model.

Independent of the management model, water scholars have identified some common success patterns among sustainable water supply systems:

- Numerous studies emphasize the importance of regular and structured post-construction support to community-based service providers, which goes beyond ad hoc technical assistance (e.g. Baumann, 2006; Schweitzer and Mihelcic, 2012). This often involves financial contributions for major repair works as well as technical and managerial support. With effective support, the community's ability to fulfil administration, operation, and maintenance functions improves and the sustainability of water services becomes more likely (Schweitzer and Mihelcic, 2012). This support may be provided by different actors: private companies or utilities, local or national governmental agencies or by associations of community-based service providers.
- Hutchings et al. (2015) emphasize the importance of collective initiative in the initial phase of community management. External actors may facilitate by conducting social mobilizations initiatives.
- In later stages, institutional transparency and leadership are identified as key aspects for long-term success. External actors may thus foster sustainability by offering periodic support focusing on leadership development and administrative processes within the community water institutions. (Hutchings et al., 2015)

As stated above, for all types of community-managed models, continuous external support is deemed a critical feature. Development agencies are faced with the challenge in setting up institutional mechanisms that guarantee regular structured support, which lasts beyond their individual project cycles. This is especially true for resource-limited settings where there is no "enabling environment" to speak of. In the following chapter, a case study in the rural mid-hills of Nepal examines this particular challenge in more detail.

# 2 Case study on community managed water supply systems in Nepal

The last few decades have seen substantial progress in the Nepalese water supply sector. In 2014, national water supply coverage has reached 84% (Department of Water Supply, 2014). Compared with earlier numbers (e.g. 77% water supply coverage in 2006), these macro-level figures seem promising and encouraging. However, they do not tell the whole story; particularly they do not paint an accurate picture of the functionality levels in the country. Only about a quarter of the water supply schemes are physically intact, without the need of either minor repairs (36%), major repairs (9%), rehabilitation[1] (20%) or complete reconstruction (10%) (Department of Water Supply, 2014). Faced with malfunctioning schemes, users have to revert to less safe sources of drinking water, like unprotected springs, ponds or streams, giving rise to a multitude of health problems.

## 2.1 Conventional Operation and Maintenance model

Why is it that some schemes fail prematurely? In theory and according to Nepalese policy provisions on rural infrastructure, three actors share the O&M duty in community managed systems: (i) User Committees (UC), (ii) maintenance workers and (iii) local institutions, such as the Village Development Committees (VDC). UCs are responsible for the formulation of local operation and maintenance policies, the mobilization of maintenance workers for regular monitoring and minor repair works, and for reaching out to local institutions (or development organisations) in case of major repairs. In addition, the UCs are in charge of raising user service fees to remunerate the maintenance workers and cover contributions to the operation and maintenance fund. Local institutions have a supplementary yet important role, as they should provide support for maintenance needs beyond the communities' financial or technical capacity, i.e. major maintenance or rehabilitation works.

In practice, this way to go about operation and maintenance faces a few challenges. Acharya et al. (2014) recapitulate the following difficulties in community managed rural water supply systems in Nepal:

- User committees mostly do a good job in the construction phase, i.e. they are well able to formulate the operation and maintenance policies, manage construction and establish the O&M fund. However, the activity of UCs tends to decline in the post-construction period, with

[1] Repair works, which are within the capacity of the users with no external inputs required, are categorized as "minor repairs". "Major repair" works are beyond the users' technical or financial capacity. Schemes are classified as "in need of rehabilitation" if they are functioning at their design level, but are not able to meet the present demand in quantity and/or quality

committee meetings and fee collection becoming irregular at first and eventually even ceasing to continue. In essence, the committees deliver in their role as “construction committees” but have difficulties to assume the role and responsibilities of a “managing committee” over the long run. For instance, the Rural Water Supply and Sanitation Project in Western Nepal (RWSSP-WN) reports that only 55% of a total of 412 schemes, collect water tariffs and pay maintenance workers on a regular basis (RWSSP-WN, 2013). The project identified inadequate revenue collection as the most critical single risk factor for the long-term sustainability of the water supply schemes (RWSSP-WN, 2016). On the one hand, this failure of the “managing committees” may be an indication of weak ownership; on a more general level, it may disclose the limits of what a voluntary institution is able to shoulder in terms of responsibility and workload.

- For capacitated maintenance workers (seasonal) migration becomes an attractive option, as they tend to find better income opportunities in urban areas. Related to the above, discontinuation of user fee collection by the UC usually also implies terminating the reimbursement of the maintenance workers. As a rather unsurprising result, a substantial fraction of the trained village workers is absent or inactive 5 to 10 years after scheme completion.
- The linkage between UCs and local institutions is often weak with no systematic technical or financial support forthcoming from the local bodies. As a result, development organizations often fill in and provide post-construction support in the form of social mobilization (re-activation of dormant UCs) as well as capacity building for the UC and maintenance workers in the first few years after scheme completion. While these post-construction follow-up and support efforts may alleviate these deficiencies for some time, they are bound to expire as project cycles end or programmes phase out.

Figure 2 shows the today’s conventional organizational set-up in rural water supply schemes in rural Nepal. Note that the figure does not show an idealized setting but accounts for the above-mentioned shortcomings.

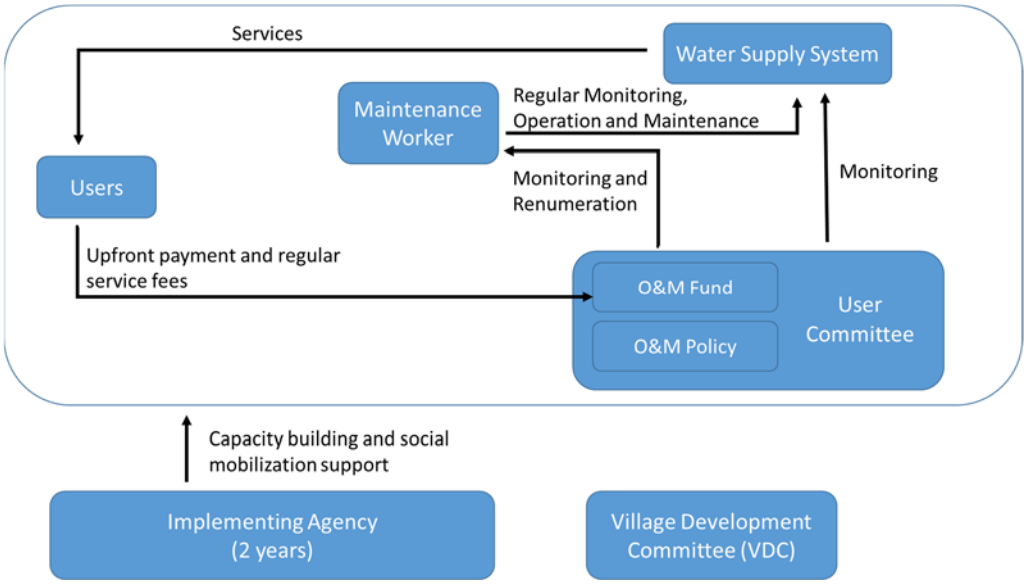


*Figure 2: Conventional organizational O&M set-up in water supply schemes in rural Nepal. Adapted from Acharya et al. (2014).*

## 2.2 New Service Provider Model

Lately, the water resources management programme (WARM-P) of HELVETAS Nepal has experimented with new ways to go about operation and maintenance of drinking water schemes. In recent years, WARM-P has piloted a service provider model, which instils a small private sector element into the existing O&M framework (mirroring the one shown above). In this revised model, the UC outsources O&M duties to a greater extent to a local service provider, i.e. the village maintenance worker (VMW). This VMW is - equivalent to the conventional model above - responsible for operating the infrastructure as well as minor maintenance works. As a new task, he also takes on the responsibility of collecting service fees from the users. A fixed ratio of the service fees is passed on to the UC, which deposits it in the O&M fund. The other fraction represents the wage of the service provider. The user fees and wage-to-fund-ratios are negotiated and fixed for each scheme individually on a case-by-case basis, as they account for the workload of the VMW as well as the community's ability to pay.

In most schemes implemented with the help of WARM-P, the user fees per household are in the range of 10 to 40 Nepali Rupies per month (under the conventional and the new O&M model). Irrespective of the O&M model, typically 80 - 90% of the collected user fees make up the remuneration of the VMW while the other 10 - 20% are deposited in the O&M fund. Additionally, the community is expected to collect at least 1000 Nepali Rupies per tap stand as an upfront contribution to the O&M fund (under the conventional and the new O&M model). This upfront payment is usually not utilized for reimbursing the VMW.

This relatively simple change in the O&M system is expected to lead to higher motivation and activity levels of the maintenance workers. For one, the VMWs are now directly responsible for collecting their wage (and contributions to the O&M fund). They thus have a high incentive to collect the user fees regularly and are less likely to become inactive. In addition to more regular salary payments, the negotiated average monthly wage of the VMWs - agreed upon with the community upfront – may be slightly higher as it accounts for the VWMs (small) increased workload in the new model.

The increased activity of the maintenance workers in turn could help to keep other actors more engaged. While regular visits of user households to collect service fees could keep the community members aware and sensitive of the need of ongoing O&M of the water supply systems, the regular payments into the O&M fund may help to keep the UC more vigilant. Although this set up brings about a reduced workload for the UCs, it does not absolve them from practicing institutional control over the system, i.e. to monitor the service providers, manage the O&M fund and enforce O&M guidelines. The pilot framework thus represents a small shift towards more professional service provision, while still accounting for the resource scarce setting and limited capacity of local institutions. Figure 3 illustrates the changes introduced by this new service provider model.

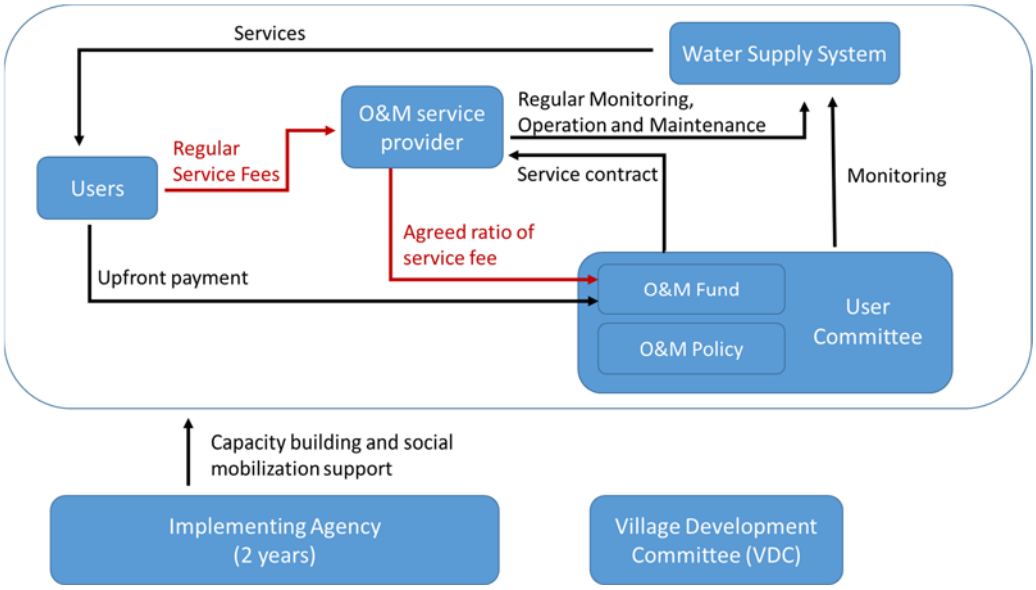


*Figure 3: New Service Provider Model piloted by the water resources management programme (WARM-P) of HELVETAS Nepal. New elements are coloured in red.*

## 2.3 Comparison of outcomes of new and conventional operation and maintenance model

This section focuses on the analysis of the technical and operational status of 27 water supply schemes of WARM-P, which were completed in 2012 and 2013. The analysed water schemes are gravity pipe water systems using spring sources in the rural hill districts of Achham (9 schemes), Dailekh (9), Jajarkot

(5) and Kalikot (4). All are operated with public tap stands, with one tap stand typically catering to 3 - 5 households. 5 of the schemes are operated under the above mentioned new service provider model while the other 22 are conventionally operated schemes. Both O&M models were introduced to the communities during the construction period. The communities then decided which O&M model they would like to implement.

The analysis is based on post-construction monitoring reports, which are compiled 2 - 3 years after scheme completion. The analysis takes into account (i) the schemes technical status; (ii) the activity level of the UC and VMW; (iii) the amount and regularity of VMW remuneration; and (iv) the amount of collected O&M funds. The data collection for the monitoring reports was carried out in 2014, 2015 and early 2016. Table 1 gives an overview on the basic characteristics of the analysed water supply schemes.

| | **New model** | **Conventional model** |
|---|---|---|
| No. of analysed schemes | 5 | 22 |
| Average No. of benefited households per scheme (min, max value in brackets) | 52 (24 - 108) | 53 (17 - 135) |
| Average No. of constructed tap stands per scheme (min, max value in brackets) | 12 (6 - 19) | 12 (4 - 22) |

*Table 1: Characteristics of analysed water supply schemes*

WARM-P prioritises schemes, which alleviate water hardship for communities with a high portion of disadvantaged individuals. HELVETAS Nepal defines disadvantaged people as economically poor (living on less than 3'000 Nepali Rupies (equivalent to 30 US$) monthly income per household member, or having less than six months food sufficiency) who also suffer from social discrimination based on gender, caste/ethnicity or regional identity. On average, 90% of the population served by the schemes are economically poor and about 60% are additionally considered as socially marginalized (WARM-P, 2013).

Community contribution to the construction costs typically ranges between 20 and 25%, which includes collection and portering of local materials as well as unskilled labour work for the distribution line network and all tap-stands. The programme reimburses the unskilled labour required for the construction of the intake structure, storage tanks and the transmission line.

A few notes of caution on the significance of the following analysis seem warranted.

- First, while the analysed water supply schemes are of similar scale and the benefitted communities are largely comparable in their socio-economic background and geographical setting, the small sample size of the schemes operated under the new model should be kept in mind when looking at the below outcomes.

- Second, the fact that the communities themselves were able to choose between the two O&M modalities may have led to a selection bias, as communities which are motivated to try a novel approach may be more resourceful.
- Third, the analysed indicators (remuneration and activity level of VMW, collected O&M funds; activity level of UC; technical status of scheme) will reflect the O&M performance to different degrees, especially in the first few years after scheme construction. For instance, the remuneration of VMWs is directly linked to the changes in the O&M framework (VMWs are responsible for collecting their own salary in the new model) and thus expected to react quite sensitive. On the other hand, even strongly diverging O&M performances do not to necessarily reveal themselves in the technical status of the system during the first few years. In the experience of the programme, failing O&M mechanisms will typically show tangible impacts in the physical structures after four to six years of operation (WARM-P, personal communication). As such, the technical status in the first few years after scheme completion may be more indicative of other influences (natural hazards; presence/absence of post construction support) as opposed to actual O&M performance. This being said, a good technical status of the system is still the prime goal of improving operation and maintenance over the long run and hence at least worth consideration.
- Fourth, in the first two years after scheme completion, WARM-P offers post-construction support to all communities, which tends to keep the UCs more vigilant and motivated. The effects of the new service provider model may thus become more perceptible a few years after external support has ceased.

With this caveats in mind and even though we present numerical data in the following tables, the comparative discussion will still be of qualitative nature and shall indicate preliminary trends in the differently managed systems. We start the analysis with indicators, where we expect the most visible impact of the new service provider model (remuneration and activity level of VMW, collected O&M funds) and then go over the indicators where attribution of changes to the O&M framework becomes less clear-cut (activity level of UC and the tap stand caretakers; technical status of scheme).

### 2.3.1 Remuneration and activity level of Village Maintenance Worker

Table 2 highlights the differences between the conventional model (UC in charge of collecting user fees) and the new service provider model (VMW in charge of user fee collection). Rather unsurprisingly, the VMWs operating under the new service provider model are able to secure their remuneration far more reliably as they are no longer reliant on the UC to pay their wages (first row in Table 2). In addition, the average VMW income is moderately higher than in conventional schemes

(second row in Table 2). This surplus income could account for the slightly higher workload of the VMW under the new model. However, this increase in salary may also have causes independent of the O&M modality, as VMWs, which work in wealthier communities or operate large schemes tend to earn more than their colleagues do. Note again, that the user fees and VMW remuneration are not prescribed by the programme but are agreed upon by the communities on a case-by-case basis. In the experience of WARM-P, the retention of VMW is often tightly connected to the regularity of remuneration (WARM-P, personal communication). In the absence of a reliable paycheck, skilled VMW tend to become either inactive or migrate to urban areas, where they find better job prospects. This is in full accordance with the findings below (third and fourth row in Table 2).

| | **New model** | **Conventional model** |
|---|---|---|
| Number of schemes where VMW receives regular remuneration | 5 out of 5 | 12 out of 22 |
| Average monthly remuneration of regularly paid VMW [Nepali Rupies] (min, max value) | 1'630<br>(600 - 2'800) | 1'250<br>(340 - 4'400) |
| Number of schemes with active VMW | 5 out of 5 | 18 out of 22 |
| Number of schemes where the VMW had to be replaced since scheme completion | 0 out of 5 | 5 out of 22 |

*Table 2: Remuneration and activity level of Village Maintenance Workers (VMW) in the new and the conventional O&M model.*

### 2.3.2 Collected O&M funds

Motivated VMWs are expected to collect user fees (and thus their income) more diligently than the voluntary UCs. At the same time, active VMW and UCs could help to keep the users engaged and aware of their responsibility to pay for the upkeep of the water supply system. Table 3 shows the regularity of user fee collection as well as the average amount of collected O&M funds (excluding VMW remuneration and the upfront contribution) under the different O&M models. While the collected funds are in similar range, the users under the new model are paying higher O&M fees more regularly. The more regular O&M payments under the new model may be attributed to a more diligent fee collection by the VMW. Analogues to the VMW salary, the amount of collected funds are not only a function of the O&M model, but are likely to be associated with the socioeconomic wealth of the community as well as the size of the water supply scheme.

| | New model | Conventional model |
|---|---|---|
| Number of schemes, which collect O&M fees on a regular basis | 5 out of 5 | 15 out of 22 |
| Average amount of collected O&M funds per month and per household since scheme completion [Nepali Rupies] | 21 | 14 |
| Average change in O&M funds since scheme completion [Nepali Rupies] | +21'000 | +16'500 |

*Table 3: Collected O&M funds (excluding VMW remuneration and upfront contribution to the O&M fund) under the new and the conventional O&M model.*

As a side note, WARM-P reports similar findings to Butterworth (2013) where users are not willing to contribute to the upkeep of very basic water supply services or enhance them through self-supply initiatives. WARM-P observes that in some communities, users are reluctant to use and properly maintain community taps and that they would rather connect separate pipes from a community tap to direct water straight to their respective houses. Moreover, users seem to be less inclined to pay O&M fees for community tap stands than for private connections. Hence, the programme now supports private taps on a case-by-case basis, subject to technical feasibility and a socio-economic assessment whether users are willing and able to pay for improved services.

### 2.3.3 Activity level of User Committee and tap stand caretakers

VMW receiving regular remuneration are expected to be more motivated and active and thus help to keep the UC more engaged. The first two indicators in Table 4 point out that the UCs operating under the new O&M model seem to assume their role in a more active way by meeting more regularly and completing the registration process with the District water council more reliably. In similar fashion, the activity level of the voluntary tap stand caretakers may have increased due to more involved VMWs.

| | New model | Conventional model |
|---|---|---|
| Number of UC which have completed registration with the District Water Resources Committee | 4 out of 5 | 14 out of 22 |
| Number of UC which meet on a regular basis (at least 3 times per year) | 4 out of 5 | 14 out of 22 |
| Number of active tap stand caretakers | 62 out of 62 | 197 out of 233<br>7 schemes with passive caretakers |

*Table 4: Activity level of User Committee (UC) and tap stand caretakers in the new and the conventional O&M model.*

### 2.3.4 Technical status

More active VMWs and UCs and increased O&M funds should eventually lead to a better technical status. As mentioned, the numbers in Table 5 below should not be over interpreted at this early stage.

| | New model | Conventional model |
|---|---|---|
| Ratio of tap stands that are in good condition and provide water as designed | 92% (57 out of 62) | 89% (238 out of 266) |
| Ratio of tap stands that are not operational | 8% (5 out of 62) | 8% (20 out of 266) |

*Table 5: Technical status of water tap stands under the new and the conventional O&M model.*

### 2.3.5 Discussion

The change in the organizational O&M set up has led to encouraging early outcomes. The new service provider model has led to a marked increase in the regularity of VMW remuneration. In accordance with decreased VMW turnover rates, WARM-P project officers emphasize the impressive motivation exhibited by the maintenance workers under the new model. This in turn seems to stimulate the UCs to assume a more proactive role and keep up with their (slightly reduced) duties. While the results regarding O&M fund collection are heartening as well, any inferences with regards to the technical status are of more speculative nature at this point in time. To this end, an analysis at a later stage including more schemes operating under the new O&M model could prove insightful.

# 3 Conclusions and Outlook

Even though the new service provider model posts promising preliminary results, its potential impact down the line is likely to be limited due to not addressing other issues in the O&M framework. In the following, a selection of these ongoing challenges are discussed with a view towards the future development of the approach.

## On the role of User Committees

Although the new service provider model reduces the workload for the UCs, it does not waive their responsibility to practice institutional control over the system, i.e. to oversee and support the VMWs and enforce the O&M policies. Over the long run, the O&M system still relies on having responsible and initiative UC members and a dormant UC will put the schemes' sustainability in jeopardy. A historically challenging phase for keeping the institutional O&M mechanisms running has been the renewal of the UC once the first generation members retire, migrate or pass away (WARM-P, personal communication). The water schemes operated under the O&M system will most probably face similar difficulties in a few years' time, coinciding with the period in which the water schemes are in need of more substantial repair works. The weak institutional capacity of user committees to enforce operation and maintenance policies poses another obstacle in reaching long-term sustainability. Once the zeal of the initial phase wears off, strong leadership is required to keep users committed to the common cause (Hutchings et al., 2015). Regular external support with special focus on leadership development may help to keep the UCs functional beyond the first generation.

## On the role of external support

While the benefits of ongoing external support to the community service providers are largely undisputed, it remains challenging to set up this support in a long-lasting manner. In the first period after scheme construction, post-construction support is typically extended by the implementing agency. However, in many cases, this support by development agencies is bound to run out at some point in time as project cycles end (in WARM-Ps case two years after construction). A stronger linkage of the UCs to permanent local institutions, which are able to backstop and support the UCs over the long-term would be preferable. However, the capacity and reliability of the VDCs – the prime candidates to assume this role - is often lacking. Still, in the long run, a stronger linkage of the UCs to local governmental bodies seems indispensable. On this account, instead of coaching and supporting communities directly, development agencies may consider building the capacity of cooperative local governmental agencies.

## On financing of major repair and rehabilitation works

Even if the UC and VMW stay committed, collect user fees regularly and receive external technical support, financing of major maintenance works remains challenging without outside assistance. Major repair and rehabilitation works are often beyond the financial capabilities of the communities in the mid-hills of Nepal.

Bakalian and Wakeman (2009) argue, that even if the communities would be in the position to raise and save substantial O&M funds, the capital financing by national and international development actors may incentivize the community to decline so. Instead, the communities may well speculate that they will receive grants from external actors when there is need for major repair works. This moral hazard may substantially weaken the communities resolve to save up O&M funds and critically undercuts cost-recovery efforts. Hence, rather than directly financing repair works, development actors may take on the role of catalysts for post-construction support.

As such, the required financial support for major repairs would preferably be institutionalized at the local governmental level. This would ensure the support of communities in need of major rehabilitation works. At the same time, local governmental agencies could keep the communities accountable for saving up O&M funds over the long term. Nowadays, individual VDCs in Nepal often do not have the budget to finance major construction works. A stronger collaboration of the VDCs with the District Development Councils (DDC) as well as relevant line agencies may help to enhance the financial capabilities. In such a system, development agencies may support institutional capacity building as well as the VDCs networking and coordination efforts.

In a similar vein, Acharya et al. (2014) suggest to install a separate O&M fund at the VDC level, which would specifically support communities in financing major repair works. The VDC monitors and backstops the UC and could - during an initial post-construction phase - rely on advisory support and capacity building from the development agency. Figure 4 depicts this suggested O&M model.

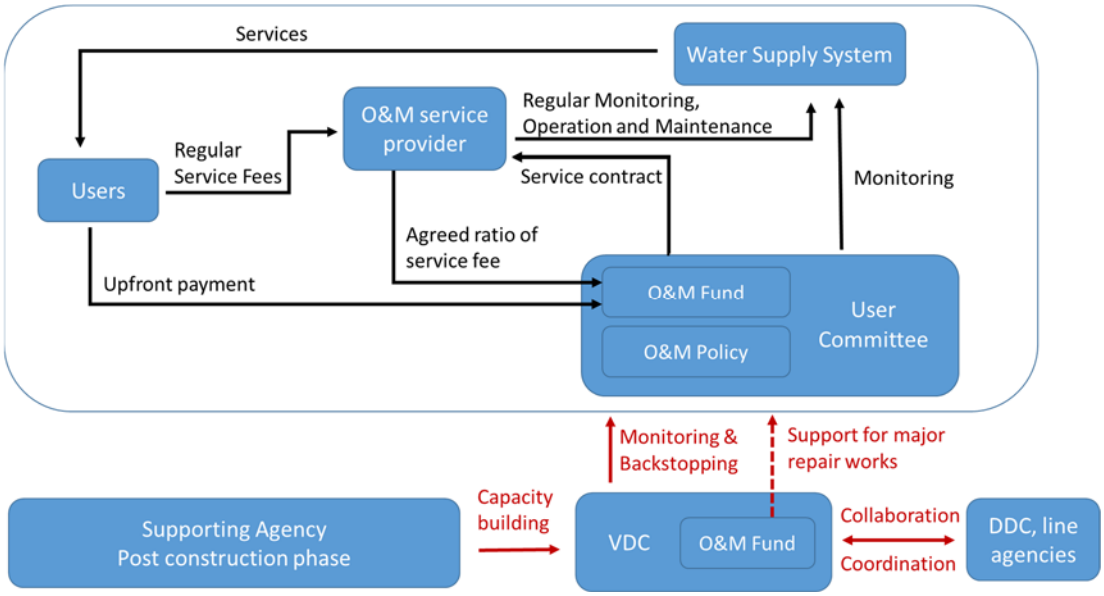


*Figure 4: Suggested O&M Model for water supply schemes in rural Nepal. New elements are coloured in red. Adapted from Acharya et al. (2014).*

## On professionalising service providers

In addition to building the local institutional capacity there is potential for a further professionalization of the local service providers (VMWs). In the present O&M model, the VMW position is essentially a part-time job, which supplements the household income. Principally, by extending their coverage to multiple schemes VMWs or other entrepreneurs may become full-time O&M service providers and offer more professional management of water supply services to communities. Whether this is the basis for a viable business model in the scattered villages on the Nepal mid-hills remains to be seen.

In conclusion, the community management approach has come a long way in the quest of establishing sustainable operation and maintenance models in the rural water supply sector. It moved from one-time investment programs that primarily focused on infrastructure provision to a paradigm that sees rural water supply an on-going service. Similarly, instead of offering a single blueprint today's concept of community management entails a continuum of different forms, which continue to evolve.

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