Factors affecting the economic sustainability of water schemes – A willingness to pay analysis in Palpa and Nawalparasi

Emma Hakala, Kandidaatin tutkielma
Helsingin yliopisto
Maa- ja metsätaloustieteellinen tiedekunta
Taloustieteen laitos

1. Introduction

Economic sustainability is an important part of any development cooperation. In most cases, development interventions are intended to become independently functional, meaning that financial assistance from external sources would be rendered unnecessary. Instead of individual projects, cooperation is therefore increasingly geared towards generating lasting impacts and local ownership. In water management schemes, this has often meant community owned solutions that generate their own revenue to cover costs for operation and management (O&M).

The planning and implementation of sustainable schemes requires a great deal of information about the local conditions, which will ultimately determine what kind of solutions are best suited in each specific case. This includes also a lot of economic data. In any kind of a tariff-based system, it is necessary to take into account the average willingness and ability of a household to pay for water services. One way to study these factors is the so-called willingness to pay (WTP) analysis, which can also provide additional information and insights into the economic basis on which the functionality of the scheme depends.

This study aims to assess the economic sustainability of the water schemes in the Nepali districts of Nawalparasi and Palpa. To do this, it will utilize WTP analysis but also other economic data based on survey responses. The aim is to find out, in monetary terms, the value given to functional water management by local households, and to shed light to how this affects the sustainability of a given scheme. In addition, the study will look at the ownership structures and administrative arrangements of the WUSCs with the aim to examine the level of (in-)equality and its effects on sustainability.

The research was carried out as a part of the NAPA WASH project implemented by the Finnish NGO Waterfinns. This means that the WTP survey was only one part of a bigger research on water sustainability issues that covered a number of water User Committees. Therefore, the study will also have the opportunity to make comparisons between more and less effective arrangements. In addition, the NAPA WASH project enabled a field trip to two case study water schemes in Nawalparasi, which made it possible to look closer behind the statistical data on economic sustainability. While the analysis in this study will inevitably be limited in scale, the goal is to produce basic data on the economic factors and to provide insights for further study and assistance interventions.

2. Water sector and cooperation in Nepal

Nepal is located in South Asia between China and India, partly covering the Himalayan mountains. It has a population of about 27 million and per capita income under 250 USD, making it one of the poorest countries in the world. It has a varied terrain with the Himalayan Mountains covering the northern parts, posing additional problems with regard to the construction and maintenance of basic infrastructure (UNDP 2010, 4). The country is also still recovering from a decade of armed conflict and political crises which continue to affect its development (Jones et al. 2014; Government of Nepal/UN Country Team in Nepal 2013b). All of this is reflected in its Human Development Index score of 0,458 in 2011, which places it above only Afghanistan in comparison to the other South Asian countries (Government of Nepal/UNDP 2014, 12).

Yet on paper, Nepal looks to have experienced considerable development in its water and sanitation sector over the past years and looks to be on track to achieve its associated Millennium Development Goals (MDGs), agreed upon by the international community in the Millennium

Summit in 2000. By 2012, Nepal had managed to raise the share of population having access to drinking water to 85% (up from 75% in 2000), and the share of the population having access to an improved sanitation facility to 62% (up from 30% in 2000) (Government of Nepal/UN Country Team in Nepal 2013b, 75). It has therefore achieved the MDG for the year 2015 on both cases.

2.1 Sector implementation and main problems

However, the promising statistics mask a great deal of problems and regional variety. Although about half (49%) of urban households have water pipes into premises, this is still rare in rural areas concerning about 14% of households (Government of Nepal/UN Country Team in Nepal 2013b, 76). On the other hand, population growth in urban areas has been high, which has been reflected in a deteriorating water access situation for poor households (UNDP 2013, 4). Overall, access to water services is highly dependent on wealth, with 47% of the richest and only 7% of the poorest quintile having a piped water source. Differences between regions are also high (Government of Nepal/UN Country Team in Nepal 2013b, 76-77).

Variation is even greater when it comes to sanitation. In urban areas, 91% of households have access to sanitation, while in rural areas, the coverage is only 55%. Again, disparities between the rich and the poor are considerable: only 11% of the poorest quintile are covered, while the figure for the richest quintile is 97%. Specifically for sanitation, differences between ethnicities are also wide, with Madhesi Dalits being the worst off at only about 5% coverage (Government of Nepal/UN Country Team in Nepal 2013b, 78).

Moreover, the numbers and statistics do not necessarily capture the whole picture on the ground. Many water connections, especially in the rural areas, suffer from disruptions and breakdowns. Water quality is often poor and the measures for monitoring it inadequate. In other words, the actual functioning water service capacity may be far lower than the statistics suggest. This is also due to the fact that inadequate attention is given to the operation and management of water services, with both investment and professional capacity lacking. In addition, the institutional arrangements for water management continue to be complicated and inefficient, as there are a number of actors at different administrative levels that sometimes carry out overlapping functions. (UNDP 2013, 4-7)

Yet the water sector is crucially important for the human development of Nepal. Adequate sanitation and especially drinking water are a basic requirement for improving population health and overall wellbeing. In addition, it has implications on education and gender equality (Biggs & Watmough 2012; Biggs et al. 2013). For instance, the lack of sanitation facilities in schools results in pupils not attending classes full time, particularly the case for young girls. Overall, women tend to suffer more from poor sanitation, as it may restrict their activities and also affects maternal health (Government of Nepal/UNDP 2014, 78; Government of Nepal/UN Country Team in Nepal 2013a, 21). Effective sanitation and water management also contribute to ecological quality and the protection of natural resources (Werner, Fall, Schlick, & Mang 2003). This is reflected in the MDGs, where water management is located under Goal 7: Ensure Environmental Sustainability.

For these reasons, it has been an important part of the efforts of international organizations in Nepal to improve water management. Various assistance schemes have been carried out over the past decades to develop the water infrastructure. The Government of Nepal has been closely taking part in these activities and increasingly financing them, although a relatively large share of the funds still comes from foreign sources (e.g. World Bank 2013, 5-6). However, there still is a lack of

funding for new schemes that would be needed to fill in the gaps in existing water management capacity (UNDP 2013, 7).

2.2 Sustainability and water fees

Yet the more challenging problem is that the existing water infrastructure appears not to be fully sustainable. It has been found that water supply coverage in Nepal is about 78%, but as much as 43% of the water supply schemes are not fully functional (Government of Nepal 2011). These figures suggest that while a lot of water supply construction has taken place, the maintenance of the schemes has not always been so successful.

In the national sanitation and hygiene master plan, the government aims to hand over more responsibility to local bodies in order to ensure their ownership and participation. However, administrative capacity and other resources are not always strong enough at the local level to take on full responsibility. Meanwhile, existing water schemes often lack economic sustainability as insufficient tariffs and deficient collection systems limit revenues. This may lead to less optimal investment decisions made only on the basis of short term necessities. Furthermore, it is not always clear that population groups have an equal voice in the decision-making on water management, thereby becoming further underprivileged. (UNDP 2013, 7) As a result, a large share of existing water management systems do not function efficiently or, especially in the countryside, at all (Government of Nepal/UN Country Team in Nepal 2013b, 80).

In particular, water management schemes seem to have paid inadequate attention to operation and management (O & M), in terms of both financing and professional capacity. In the worst case, this leads to a neglect of the systems that have been built, and thereby a waste of investments that could yield benefits on a much longer term. As recent sector policy overviews point out, there is a higher interest for constructing new schemes from scratch rather than rehabilitating existing ones. Also, the cost recovery is not working efficiently within many schemes, so they have to be subsidized externally. These issues seem to be interlinked, as the lack of funds contributes to the deterioration of the system, which in turn may make it yet more unpopular to continue paying it. An enhanced service level, on the other hand, could make adequate payments more acceptable. (World Bank 2013, 13-14; Water Aid 2013, 10-26)

The major challenge now is to improve the sustainability of water services, and ensure their functionality even without external support. This seems to be what the major international agencies functioning in Nepal have turned their focus towards, trying to find measures to promote sustainability in the water sector rather than new projects. One of the most important parts that has to be factored into the equation is strengthening the payment mechanisms of existing schemes. For example, a post-implementation survey carried out by WaterAid in its projects implemented from 2007 to 2011 in Nepal found that an increasing share of the schemes were utilizing water fees, and that in an increasing number of schemes the fees were also adequate to cover operation and maintenance costs. The study did not in any way assess the crucial question of the impact of the fee collection on the functionality and sustainability of the scheme, however. Yet the large percentage of schemes with fee collection in 2011 (84%, as opposed to 18% in 2007) suggests that the practice is becoming increasingly common in development projects. (WaterAid 2013, 16-17)

Either way, decisions and plans regarding fee collection are difficult and economically risky to make without comprehensive information concerning the willingness of the participants in a given scheme to financially contribute to its maintenance. This thematic could benefit from approaches utilizing environmental economics, particularly willingness to pay analysis. While merely

compressing the problem into one of market economics would certainly not work in the development country context, this method can yield important information to be used for planning. By extension, it could help particularly with finding new solutions to questions about sustainability, functionality and local ownership, all of which are central to improving the water management systems in Nepal.

2.3 Ownership structures and equality

The issue of fee collection relates closely to ownership, which is another significant theme in the sustainability discussion. When fees are being enforced on something that is as fundamentally important and, on the other hand, clearly common property as water, it is necessary to very carefully determine who benefits from the fee collection and how. In addition, the arrangement of water delivery and its governing structure are of key importance with regard to its potential to achieve equality and, by extension, sustainability.

Decentralization has been a long process in Nepalese governance and is still going on (Rautanen 2007, 46-48; WaterAid 2008, 3-5). One result has been the establishment of Village Development Committees (VDCs) as the main body of local governance. VDCs are independent but under the coordination of District Development Committees (DDCs). WUSCs are registered by the DCCs, but in principle they are themselves responsible for the implementation of the water scheme. WUSCs should be formed within the community and have representation from all of its members, including different castes and ethnicities as well as women (World Bank 2013, 4 (Annex I); Joshi 2011, 40). The idea is to allow all the members of the community to have an equal say in the decision-making concerning the water scheme.

The community-based ownership certainly is an asset, but it does have its challenges. It is not always a given, for example, that the WUSCs will have adequate means to fulfil all their tasks. In Nepal overall, local governance had suffered from a lack of financial and personnel resources particularly at the VDC level. The situation has been worsened by the impasse over formulating a constitution, which has considerably hindered all political and legislative processes and is said to maintain an atmosphere democratic stagnation that is feeding corruption and instability (Snellinger 2015, Jones et al. 2014, Joshi 2011). The constant political reshuffling has also hindered institutional development and coherent policy-making (Bartlett et al. 2010). These issues are likely to affect the functionality of the WUSCs. In addition, although there the WUSCs are required on paper to be representative of the entire community and to integrate marginalized groups, it does not automatically follow that such objectives are fulfilled and that all groups truly have a chance to make their voices heard. In other words, the actual ownership relations are not always as clear as the WUSC plans might suggest.

Although financing for the initial investment to build the water source often comes from external sources, the idea is to ensure that the community is able to fund its maintenance. Therefore, according to Rural Water Supply and Sanitation National Strategy from 2004, the WUSC should establish an O & M fund as well as a rehabilitation fund. These should be financed through water fees, assistance from the DDC and VDC, and/or contributions from external sources (World Bank 2013, 3-4 (Annex I)). Thus the water fee is of considerable importance to the sustainability and functionality of the water scheme. In addition, due to the community-based ownership structure the benefits of the scheme accrue to all the members of the community and can further enforce a sense of ownership and responsibility. Obviously, it is important that the fees are set in a way that they are acceptable even for the ultra poor to pay but still high enough to cover O & M costs (e.g.

WaterAid 2013, 16). If this is not otherwise possible, assistance of some form could be considered to the poorest households (e.g. Tiwari 2008, 37).

One potential problem facing the fee collection is non-payment, when households simply refuse (or are unable) to make their financial contribution. The WUSC should have mechanisms to deal with this in order to prevent 'freeriding' (Tiwari 2008, 52), which might discourage the prevailing sense of commitment to the scheme in the community as a whole. It should also be emphasized that the fee can be paid in kind through work or other contributions if cash is not available (WaterAid 2013, 16). In addition, practical constraints may hinder the financial administration of the schemes. The WUSC may not have adequate expertise and resources for bookkeeping, which again might erode trust in the accountability of the system. Partly to address this, it would be important that the funds are kept on an account in a bank (World Bank 2013, 13 (Annex II). However, in more remote areas access to bank services may be an issue. In addition, banks do not always pay interest on the kinds of accounts used by WUSCs. To overcome some of these obstacles and to facilitate the overall financial effectiveness of the schemes, some WUSCs have started to establish or participate in cooperative structures for managing the finances. These kinds of solutions can potentially contribute to the sustainability of the scheme, and demonstrate a degree of commitment and self-organization (Haapala et al. forthcoming, 9-11).

The administrative and financial structure of the WUSC inevitably also affects the level of equality – and the prevailing sense of equality – within the community. The inclusion of vulnerable groups in decision-making, allowance of special conditions to ultra poor households and equal provision of water connections, for instance, are factors that will affect the sense of community and ownership within the WUSC. These, in turn, are likely to have an impact on the willingness to pay for the water service and therefore also on the long-term sustainability. These questions are particularly salient in a post-conflict society like Nepal where inequity and poverty may have contributed to the escalation of instability. It is therefore especially important for international cooperation interventions to ensure that they help to decrease rather than reinforce unequal social structures.

The ownership structures concerning WUSCs, and particularly the cooperative solutions that are increasingly starting to emerge, present new options to improve the financial sustainability of water schemes. However, they may also present new challenges to transparency and accountability. Either way, ownership is of considerable importance with regard to overall sustainability. This study will therefore aim to look at the ownership structures and administrative arrangements to the extent that it will be possible.

3. Economic sustainability and willingness to pay

As the situation in Nepal shows, economics are becoming increasingly important in understanding the sustainability of water supply even at the local level. Therefore, there is a clear need for the analysis of economic factors as well as the societal issues affecting them. However, this kind of an approach creates problems of its own. Reliable economic data may be lacking, and is often limited to financial figures like the spending and income of a particular water scheme. Data on the wider economic indicators on the population, such as income levels and educational background, may be far more difficult to obtain. In addition, perhaps partly as a result of the previous problem, economic analysis may often be overly one-sided and focus exclusively on economic modelling while neglecting societal impacts not captured by the numerical data.

On the other hand, economic analysis on non-market data has challenges of its own. Economic methods tend not to take into account societal factors, which can be difficult to compress into statistical figures. Environmental economics, in particular, has often revolved around finding ways to perform market analysis where markets do not exist. One of the most common ways of doing this is willingness to pay analysis (WTP), a contingent valuation (CV) mechanism used to assess the benefits related to environmental changes using surveys. However, basic statistical analysis on economic data – particularly of the kinds usually collected for a WTP study – can also yield interesting insights, especially in contexts where such indicators have previously not been researched. The present study is a combination of these two approaches.

WTP enables the assessment of value in non-market conditions. (Champ 2003, 59) CV methods have the advantage that, unlike traditional analyses performed on observed variables, they enable analysis of future conditions. They can thus be applied in market analysis for new products (e.g. Camron & James 1987; Breidert, Hashler & Reutterer 2006), but also in cases where markets do not exist or are not fully developed. They are therefore also useful for evaluating the sustainability of specific initiatives and investments in development cooperation projects (e.g. Whittington 1998).

WTP is taken to represent the value that consumers attach to a change in an environmental good or service, given in monetary terms and thereby enabling econometric analysis. It is determined by eliciting from consumers how much they would be willing to pay for the good or service, or for an improvement in its existing quality (Whittington et al 1990, 294). CV studies therefore essentially require the performance of a survey among the group of people that would benefit from the new service. It is crucial that the survey questions are very carefully planned and adjusted to fit the conditions of the region under study; otherwise the results will have very little practical value. In addition, asking people about their willingness to pay easily creates biases that should be taken into account and controlled as much as possible (Champ 2003; Wedgwood & Samson 2003, 51-55).

Therefore, the validity of a WTP analysis depends considerably on the elicitation method. This requires a great deal of knowledge about the existing situation in the study region, including the specifics of the current water management system used, the current price paid, measures of payment collection, ownership and many others. The aim is to adjust the WTP questions into the actual conditions in such a way that the respondent can and will give it serious consideration. (Champ 2003, 82-99; Wedgwood & Samson 2003, 36-37) Clearly, it does not make sense to ask respondents about scenarios that are entirely hypothetical to them, but it is equally important to frame the questions in a way that they can understand and relate to.

The basic question format is to simply to ask how much a respondent is willing to pay for a change in an environmental good or a service, without giving any additional choices or sums. This is described as the open-ended question. As it does not provide the respondent with any clues or predetermined values, it can be seen to elicit a relatively unbiased answer. However, this format has also been criticized precisely for the lack of reference value, suggesting that it is exceedingly difficult for the respondent to answer (e.g. Foreit & Foreit 2004, 5). As a result it may yield a great deal of non-responses and zero values (Damschroder, Ubel, Riis, & Smith 2007, 96).

Yet closed-ended question formats, where respondents are presented with specific values, have problems of their own. In a bidding game, where the respondent is given a starting value that will be raised until the s/he declines to pay, the results may easily differ depending on the value of the starting bid (Wedgwood & Samson 2003, 48; Damschroder, Ubel, Riis, & Smith 2007, 97). Another alternative is a payment card, where respondents are shown a list of values from which

they are asked to choose, but this method is prone to be biased on the basis of the range of values that are chosen on the list (Wedgwood & Samson 2003, 49).

While the different methods produce different results, there is no absolute way of determining which ones are the most accurate (Venkatachalam 2004, 109-111). This suggests that WTP is always a highly context-dependent form of analysis. This dependency is not limited to the specific geographic, cultural or economic conditions, but also applies to the particular research questions. As a result, it may be useful to not only look at the data produced by the basic question about willingness to pay, but to reflect it upon other relevant data, such as income, education, ethnicity and equality. In addition to complementing the picture about WTP, such factors can reveal interesting aspects about the conditions on the ground.

4. Study design and NAPA WASH project

The study was carried out in the Nepalese districts of Nawalparasi and Palpa, in water schemes that have been constructed between 1990 and 2005 within the Finnish-funded Rural Water Supply and Sanitation project (RWSSP). It consists of a willingness to pay analysis in order to better understand economic factors behind the sustainability of water management schemes in Palpa and Nawalparasi. In particular, it aims to establish the willingness of local households to pay more for their water supply in order to obtain better services. Furthermore, it examines what kinds of external factors affect the average WTP. On the basis of this, the study attempts to identify ways to improve the financial basis of the schemes to achieve better sustainability.

The initial idea was to build the entire study solely on the WTP analysis. However, there also was the possibility to perform a short field study, which gave rise to the idea of comparing the results of the statistical analysis to those given by field research on the ground. Furthermore, the field study revealed several interesting factors that were very difficult or impossible to discern from the survey data. This, in turn, suggested that the research could yield far more interesting and potentially applicable results if the analysis combined the two different kinds of data instead of being limited to the survey responses.

Therefore, the study has focused on two main questions that are closely connected and to some extent inter-linked: What is the willingness to pay of water users for improved services? What kinds of factors affect willingness to pay? To form a more detailed picture, the analysis considers other, additional factors that may have an effect on both willingness to pay and sustainability, such as income, education, caste or ethnicity, but also factors that are less easily discernible like the level of trust in the functioning of the WUSC and satisfaction with the quality of the water service.

To a lesser degree, the study looks at the ownership structures and financial arrangements of the scheme with regard to their role in addressing equality and, in consequence, sustainability. Equality within the community is likely to be one of the main issues affecting the level of ownership and participation shared by individual households within the scheme. It is therefore useful to examine how these affect WTP. Clearly, these also are extremely challenging questions to chart either in a survey or through interviews, partly due to the elusiveness of factors like ownership and trust and partly due to the potential sensibility of addressing these issues. Some idea can, however, be formed through questions such as the level of satisfaction with the water service, knowledge concerning the administration and use of the water fee, and the degree of participation in scheme construction and decision-making. Interviews with the WUSC officials further elaborate this picture from a different point of view, as do questions concerning the actual financial administration of the scheme.

The basis of the research was a survey carried out in the Nawalparasi and Palpa districts within the NAPA WASH project in January 2015. This effort yielded results on a far wider scale beyond the WTP study detailed here, including questions on the management, financing, technical factors, environmental impacts, attitudes and other important issues concerning the schemes. The WTP study is only one element of the total survey, focusing on the economic and financial aspects. However, parts of the overall study certainly have been useful for this analysis, and are utilized to further illuminate the results wherever possible. The realization of such a comprehensive survey with a relatively large sample size presents a rare chance to understand the water usage trends in their societal and cultural context, and might therefore raise observations unforeseen at the planning stage.

The analysis of the survey data was complemented by a field study in Nepal, carried out in April 2015 in Nawalparasi. The idea of the fieldwork was to give context to the WTP analysis and to enable further consideration of the implications that its results have with regard to the financial sustainability of the water schemes. While the data analysis as such can answer questions concerning the variables that affect WTP, such as income, social status or satisfaction with the scheme, it can easily present a very shallow picture if taken alone and out of context. There will, inevitably, be circumstances in the field that are not captured by the survey questions but that will still have a significant effect on the background of willingness to pay. It has been suggested in the literature that the physical presence of the researcher in the target region will yield insights that considerably affect the analysis but could otherwise be missed (Wedgewood & Sansom 2003, 137). Obviously, a relatively short field study will not be adequate to give a detailed picture either, but it can at the very least elaborate it and yield points for further study.

4.1 NAPA WASH Project

The case study district of Nawalparasi is located in the Lumbini zone of the Western Development Region of Nepal, directly at the Indian border. It is partly situated in the flat Terai land and partly in the Hills. The district is relatively undeveloped although it also fosters a great deal of Nepal's agricultural production (Biggs & Watmough 2012).

Nawalparasi was included in all phases of the Finnish Rural Water Supply and Sanitation project (RWSSP), which spanned from 1990 to 2005 in altogether three phases. Overall, the project aimed to improve water supply coverage, sanitation and health, but also to promote local water governance and institutional capacity. A number of schemes were constructed as a part of the projects (Finnish Ministry for Foreign Affairs 2005).

The Nawalparasi and Palpa Districts Sustainable Water Supply and Sanitation Project (NAPA WASH) is funded by the Finnish Ministry for Foreign Affairs for the years 2014-2016. The aims of the project are to study the long-term sustainability of WASH services in the project zone where Finland has had long term water sector interventions in 1990-2005, to enhance the capacity of local institutions in managing WASH services with respect to human rights principles and to identify and develop model Water User Committees and safe water VDCs as benchmarks of good practices for long-term sustainability (Waterfinns 2013). The project includes a field assessment to gain information about the long-term sustainability of water schemes in selected VDCs. The assessment consisted of a survey carried out at the VDC, WUSC and household level in altogether 48 VDCs as well as field research in sample water schemes by four Finnish students during the spring of 2015.

Interviews were also made at the DDC level and with national ministries and other relevant institutions.

The field research for this article was carried out in two schemes: the Water Supply and Sanitation Scheme of Ramnagar in the VDC of Ramnagar, and the Water Supply and Sanitation Scheme of Jousimajhuwa in the VDC of Dedgaun. Ramnagar VDC is situated in the Terai, near the Nawalparasi district capital. It is on the East-West Highway, meaning that there is an all-weather road enabling access. The Ramnagar Water Supply and Sanitation scheme covers Wards 1, 5 and 6 of Ramnagar, serving about 1000 households altogether. It was built in the Phase III of the RWSSSP Project, which lasted from year 1999 to 2004. The Jousimajhuwa WSS is in the VDC of Dedgaun, which is located in the hills and remains without road access during the rainy season. In the VDC it covers wards 6, 7 and 8, serving about 155 households, and was built in the first phase of the RWSSSP project (1990-96).

4.1 Survey questions and analysis

The WTP study constitutes a relatively small part of the overall survey. The main concern was to elicit an answer to the WTP question; however the analysis was facilitated with some crucial background questions regarding the current system of water tariffs as well as the economic standing of the household. As the survey was also carried out among the water UCs, additional questions were directed at the respondents at this level. The main questions to them concerned the optimal level of payment that would be needed to make the water scheme functional.

The decisive and perhaps most difficult part of the study design was the formulation of the WTP questions. This was partly due to the challenges of WTP analysis overall, and partly to the problems associated specifically with the present case. The issues with WTP overall have been described in Section 2 above, so the focus here will be on explaining the choices made particularly in this case study.

As mentioned above, the survey covered 80 WUSCs that are all independently responsible of their water management. While this indeed presents an ideal opportunity to study the factors contributing to more or less successful arrangements, it also implies complications with regard to designing the survey questions. As the same questions were posed to all respondents, they could not fully take into account the differences in conditions within UCs. Instead, they had to remain fairly general, in order to be applicable to the different scenarios.

The challenge, thus, was to make the questions generally applicable while still being able to produce relevant data. It was decided that the best way to achieve this would be to choose an open-ended question; that is, refrain from presenting any price options to the respondents. This should stave off the problem of having to determine alternatives that would be relevant for very different current price levels. The open question has been considered a relatively unbiased method, as leaves the respondent to make up their own evaluation of their WTP rather than building on pre-determined rates. For this same reason, however, it also is fairly difficult for the respondent to answer. Quite obviously, respondents cannot be expected to actively think about their water tariff or consider their willingness to pay for it. The risk therefore is that the difficulty for the respondent to evaluate their WTP might distort responses. While this effect cannot be thoroughly prevented, there are several measures to minimize it.

Firstly, instead of simply asking about the willingness to pay, the respondents were asked about their willingness to pay more, i.e. additionally to the price they are currently paying, if the water services are improved by a specific degree. While this won't fully remove the difficulty of evaluation, it will explicitly allow the respondents to consider the price in proportion to what they are paying currently, and to evaluate their maximum ability to pay. Secondly, the framing of the question is significant. Immediately preceding the WTP question, the respondents were asked to evaluate the current level of their water service, and to choose from several alternatives an improvement in the services that they would most prefer. The WTP question thus refers to the improvement that the respondents themselves have chosen. The idea was to make a hypothetical improvement slightly more concrete, and thereby also easier to evaluate in monetary terms. Finally, the survey questions concerning other economic factors will give a context to the willingness to pay, and thereby also make it easier to evaluate.

It is perhaps useful to reiterate, also, that the aim of this study is not to establish the conditions for a new investment as such or to prepare for the introduction of a market mechanism in the local water management schemes. Instead, this research primarily attempts to yield relevant and comparable information about the overall economic sustainability of the arrangements at different UCs, and to compare these between each other. The work done here should be regarded as a potential basis for further study on the topic, possibly leading up to more detailed studies in specific UCs, or alternatively to contribute to the planning of improved management systems at a wider scale.

In a WTP study, it is especially important to make sure that the respondent understands the questions and has enough information to be able to evaluate the answer in realistic terms. There are a number of issues that should be clarified before getting started with the survey, and some reiterating points that should be mentioned while asking the questions.

At the beginning of the survey, at least the following issues should be explained:

1) The goal of the research is to improve the water supply in the community. For that, a lot of background information is needed. The results of the study will be made use of and communicated to the authorities and local community leaders, but at this stage it is impossible to promise that all the recommendations from this research will be implemented.
2) However, it is very important to answer the questions truthfully and realistically. The answers will be used to help the community improve the system so that it would function better. Inaccurate answers might give misleading results that will not benefit the community. For example, stating a higher price than is actually possible to pay than might overestimate the average willingness to pay and lead to higher price increases than you can afford. Giving a lower price, on the other hand, could mean that there will be no improvements to the system, as it will be assumed that there is no demand for those.
3) It is also important to consider how much the household earns and consumes in total every month, and to think of the possible water payment in relation to those.

The survey data for the WTP study was analysed using statistical methods. Various, sometimes very sophisticated econometric tools have been developed precisely for the purposes of WTP studies, especially in more complex cases with a range of variables and very specific models to predict the outcomes. For basic analysis, however, it is often adequate to use less rigorous methods, such as cross-tabulation and chi-square ($\chi 2$) test. In addition, multiple regression analysis was used to identify links between the additional factors and willingness to pay.

4.2 Field study

As it was not possible to perform a long field study, the research had to be carried out efficiently and concisely. The activities were therefore narrowed to two WUSCs, to allow some comparison while still making it possible to get a relatively conclusive idea of the practices and particularities of each visited WUSC. The choice was made on the basis of the survey data as well as other knowledge, taking advantage of the experience of the local partners of the NAPA WASH project.

The field study proceeded through interviews of the key actors in the UC, mostly in group sessions. These were attended by the chairperson and vice-chairperson, treasurer and several members, as well as the village maintenance worker. In addition, interviews were carried out at the VDC (at least one official) and national ministry level. Some discussions were had with other stakeholders, such as community based organizations, cooperatives and development banks.

The materials gathered during the field trip were not intended to enable an elaborate quantitative or qualitative analysis. Such methods are therefore not relevant here. The interviews will thus also be carried out in a semi-structured format (sample questions below in Section 6) with relevant variations from one interviewee to another. The aim of the field materials is to provide a context for the survey data, thereby facilitating analysis and opening the floor for new questions for further study.

The choice of WUSCs for a closer field study was based on both the WTP results and other relevant sustainability factors. In order to allow a degree of comparison, the aim was to find two WUSCs reporting relatively different values in the indicators. However, the idea was not to find mirror images or fully representative samples of the district, rather than two interesting cases providing a basis for closer analysis.

As the survey data in Nawalparasi did not provide a great deal of answers on the WTP question (only 231 out of 675 households), it is clear that the WTP data can only be indicative and not fully representative of the whole district. However, there are clear differences in the number of replies among schemes, meaning that for the field study, it made sense to focus on those schemes that provided more answers. Another factor was the current price of water: the idea was to make comparisons between a high and a low price. In addition, the plan was to find a scheme where WTP would be low compared to the current price and another scheme where the relative WTP would be high. The quality of water in the scheme was also a factor as it was taken as an indicator of the overall sustainability. As for financial administration, the idea was to choose one scheme providing a communal tap and one also providing private taps. Other relevant factors were the tariff collection rate, the principle of deciding tariff rate, as well as the adequacy of current income.

Based on all of these factors, the two schemes were chosen: Jousimajhuwa Water Supply and Sanitation Scheme in Degdaun, and Ramnagar Water Supply and Sanitation Scheme in Ramnagar. Both schemes reported results that were interesting from the point of view of financial sustainability, and were also relatively different from one another. Case selection will be discussed further in Section 5.2.

5. Data analysis

5.1 Statistical analysis

The survey data was collected separately for the two districts. The analysis will therefore be based on both separate and combined data, in order to highlight differences between the regions but also suggest trends for the total sample. There were altogether 680 respondents from each district, with 40 schemes from 24 Village Development Committees (VDCs) in Nawalparasi and 40 schemes from 25 VDCs in Palpa.

5.1.1 Willingness to pay

It is useful to start by looking at some basic statistics concerning willingness to pay and comparing the results for the two districts.

Table 5.1 Number of respondents willing to pay more

DISTRICT	Nawalparasi	Palpa	Total
Amount	680	680	1360
Willing to pay more	230	272	502
Not willing to pay more	315	58	373
Don't know/no answer	135	350	485

Table 5.2 Percentage of respondents willing to pay more

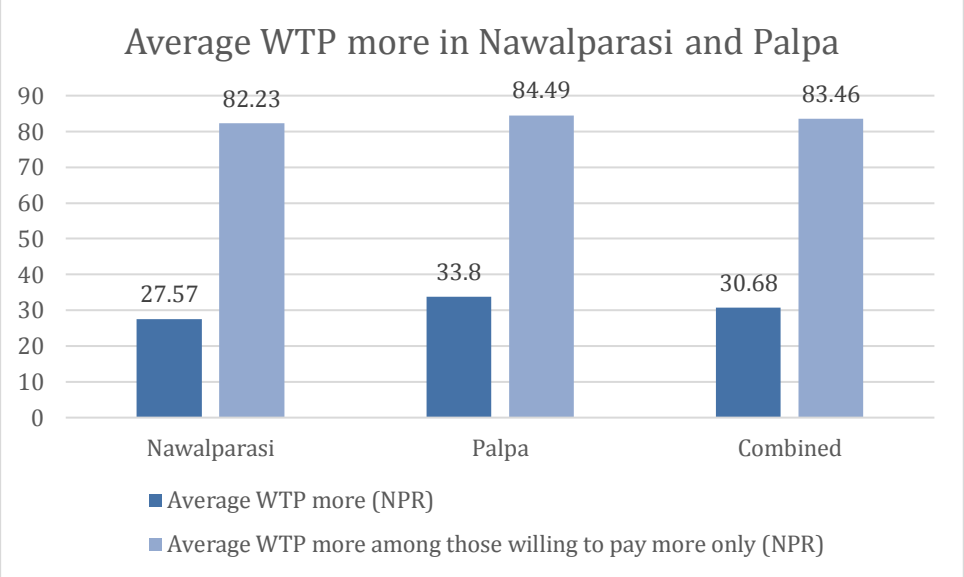
DISTRICT	Nawalparasi	Palpa	Combined
Willing to pay more	34 %	40 %	37 %
Not willing to pay more	46 %	9 %	27 %
Don't know/no answer	20 %	51 %	36 %

The first and very crucial observation that can be made about the survey data is the high percentage of don't know/no answer responses. This is particularly notable in the data for Palpa, where 350 respondents (51%) gave this answer. In Nawalparasi, on the other hand, the number of respondents not willing to pay more is high at 315 (46%). This discrepancy suggests that there are significant differences between the two districts that affect the willingness to pay.

One factor that is likely to have an impact here is the prevalence of water payment at present. It turns out that in Nawalparasi, 550 households out of 680 report to be paying for water (81%), whereas in Palpa only 331 do so (47%). In Palpa, 19 out of the 40 WUSCs that were studied did not have a water tariff, while in Nawalparasi only six out of 40 did not have one. In particular, this difference is likely to explain the large share of Don't know/No answer replies from Palpa. It seems that households not paying a tariff at present have found it difficult to estimate whether they would be willing to pay one.

In addition to asking the respondents whether they were willing to pay more for water overall, the survey also asked for the specific sum that they were willing to pay more. 230 respondents in Nawalparasi and and 272 in Palpa gave a reply to this question. Figure 5.1 shows that the differences between the two districts are not very big, particularly when only looking at those respondents who said they were willing to pay more.

Figure 5.1



The current price is also an interesting comparison to the WTP more, because it gives an idea of what kind of a price level the respondents are used to. In addition, the current price determines the total price that the respondents would be willing to pay for water. However, here too it should be noted that not all water schemes charge a water fee at present.

Figure 5.2

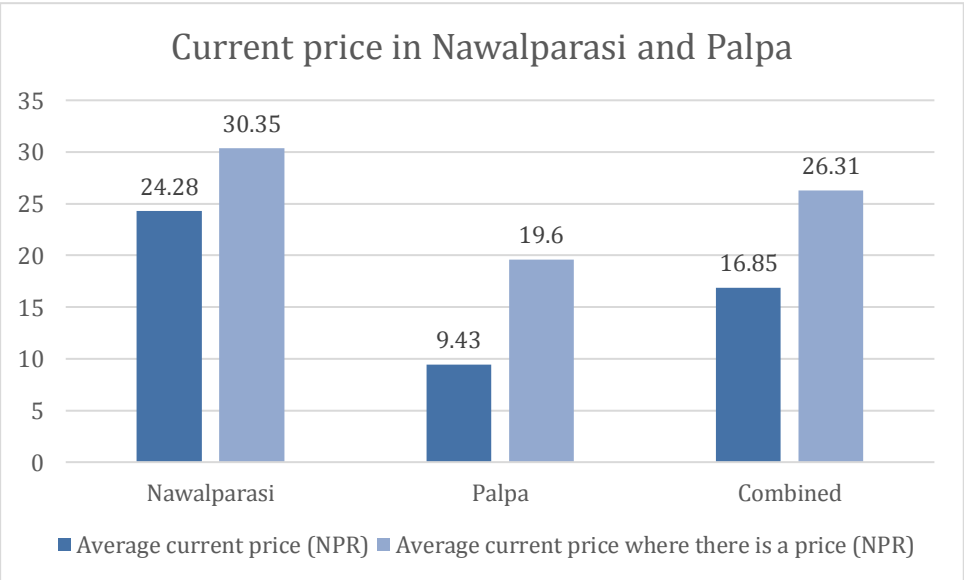
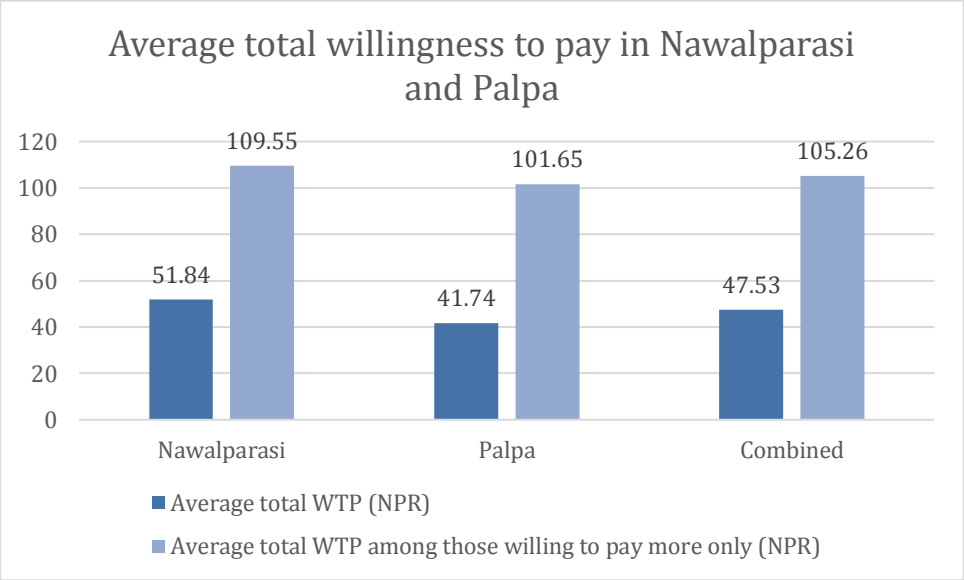


Figure 5.3



As can be seen from Figure 5.2, the current price in both districts is lower than the WTP, considerably so in Palpa. When households that do not currently have a water price are left out, the average price rises slightly, but still remains below the total willingness to pay for water. Especially when looking only at the households that are willing to pay more, the difference between the current price and total WTP is significant.

It could be expected that WTP more would correlate in some way with the current price. A high current price may suggest that respondents are used to relatively high payments, but on the other hand it could also lead to less willingness to pay any more. The evidence for both Nawalparasi and Palpa seem to suggest that the impact is a combination of these two, as the correlation between the current price and WTP more is weak although positive in both cases.

Table 5.3 Correlation between current price and WTP more

DISTRICT	Nawalparasi	Palpa	Combined
Correlation between price and WTP more	0,28	0,43	0,17

In other words, the households in both Nawalparasi and Palpa are, on average, willing to pay more for water than they currently do. This suggests that on average the water fee is lower than its value to the users. Even including households that responded they were not willing to pay more, the average WTP still remains well above actual price. This again shows the considerable variation between schemes: it seems that especially in Nawalparasi there are some households where willingness to pay more is high, but also many households that are not willing to pay more at all.

Several interesting points arise here. Firstly, the average total WTP cannot be said to be the ideal water price in a given district. For one thing, even a significant price rise is not necessarily enough to cover unit costs and therefore is no guarantee for economic sustainability. Therefore, there may be significant differences in other factors between different schemes. From this observation follows

another question, namely what kinds of external factors affect WTP. This can be tackled by examining the responses to the social and cultural questions in the survey. These two issues will be discussed in the analysis below. Finally, it would be useful to understand why the prices in fact are so low compared to the current price. This question is beyond the scope of the statistical analysis, but it will be considered on the basis of the qualitative analysis of the case studies below.

5.1.2 Willingness to pay and external factors

As the previous analysis shows, there are interesting differences in WTP between Nawalparasi and Palpa. This observation makes it interesting to look at some independent variables that might explain some of the differences.

First, a set of variables from the survey was chosen to explore the impacts of various factors on WTP. These choices were made on the basis of previous research, information about the districts and the overall survey data. The hypothesis table below shows these variables as well as their expected impact on WTP more.

Table 5.4 Independent variables and hypotheses of their impact on WTP more

Factor	**Effect on willingness to pay**	**Reasoning**
Gender: Male respondent	Positive	In charge of household spending
Literacy: able to read and write	Positive	Indicates higher education and income
Literacy: not able to read or write	Negative	Indicates lower education and income
Caste: Brahmin/Chhetri/Thakuri	Positive	Higher' castes indicate higher education and income
Caste: Dalit or Janajati	Negative	Lower' castes indicate lower education and income
Connection: private	Positive	Better service; ability to affect spending
Pricing: metering system	Positive	Ability to affect spending on water
Preferred service improvement: Reliable supply	Negative	Indicates water shortage (often impossible to fix by paying more)
Preferred service improvement: private connection	Positive	Indicates willingness and ability to pay for improved service
Water quality wet season: satisfactory to very good	Positive	Indicates service worth paying for
Water quality wet season: very poor or poor	Negative	Indicates poor service
Level of water services: satisfactory to very good	Positive	Indicates service worth paying for
Level of water services: very poor or poor	Negative	Indicates poor service
Participatory decision-making: satisfactory to very good	Positive	Participation indicates ownership
Participatory decision-making: very poor or poor	Negative	Indicates lack of ownership
Satisfaction with current O & M: Yes	Positive	Indicates satisfaction with current activity of the WUSC
Sense of ownership: Me/family	Positive	Indicates ownership of water scheme

Sense of ownership: Community	Positive	Indicates shared ownership
Sense of ownership: Water Committee	Negative	Indicates lack of ownership
Sense of ownership: Government	Negative	Indicates lack of ownership
Sense of ownership: Donor	Negative	Indicates lack of ownership
Priority for spending: Water	Negative	Indicates high share of income on water
Priority for spending: education	Positive	Indicates education and income
Priority for spending: healthcare	Positive	Linked to sanitation? Indicates higher income
Priority for spending: food	Negative	Indicates low income

The different factors can be broadly divided into four categories: social, water system, functionality and community participation. These are listed in Table 5.5 below

Table 5.5 Grouping of independent variables

Social	Gender
	Literacy
	Caste
	Spending priority
Water system	Water connection
	Pricing
Functionality	Preferred better service
	Water quality
	Service level
	Satisfaction with O&M
Community participation	Participatory decision-making
	Sense of ownership

The grouping is not conclusive or flawless, however it helps to understand some of the expected impacts on WTP. Social factors are concerned with the economic and societal standing of the household and the respondent. For example, gender may indicate a weaker or stronger position in a culture where gender inequality still is high; in this case it has been assumed that men tend to be in charge of the household budget and therefore possibly more likely to be able to make the decision to pay more. Literacy suggests a higher education level and higher income resulting in a higher consumption potential. In Nepal, caste is a significant indicator of income and social standing: higher castes like Brahmin/Chhetri/Thakuri would suggest a positive impact on WTP while lower castes like Dalit or Janajati would imply negative impact. Finally, spending priority has been assumed as another indicator of income: priorities on basic necessities like food and water suggest lower income and a negative impact on WTP, while priorities on healthcare or education, although also extremely important, have here been interpreted as an indication of slightly higher income level and therefore positive impact on WTP.

Meanwhile, water system factors are directly related to the way in which water is supplied and paid for. The household may have a private water connection, usually inside or in the yard of the house and paid for by one household alone. Otherwise households may use a public tap, usually located some way off and both used and paid for by several households. It is clear that the private option is

more convenient and also makes it easier to control the spending on water, which may make the private tap households more willing to pay more. In addition, private taps usually are charged by a meter system, which on the other hand is more difficult to impose efficiently on a public tap. Metering also improves household control over water spending, as it enables them to pay exactly for the amount that they use, as opposed to a fixed bulk sum payment that remains unchanged regardless of actual water use. Therefore, a meter system is expected to have a positive impact on WTP.

Functionality factors concern the performance of the water system. The question about the service improvement that the households would prefer indicates which problem is considered the most acute. Here, the impacts are quite difficult to predict. Preference for reliable supply may imply water shortages, which tend to be difficult to fix simply by raising the price of water in the scheme; therefore the impact is expected to be negative. On the other hand, if the preferred improvement would be the establishment of a private connection, the household may simply be dissatisfied with the current pricing and water payment mechanism and therefore willing to pay more for a better functioning one. As for water quality, it is expected here that poor quality indicates dissatisfaction and therefore lower WTP while good quality suggests the opposite. Likewise, if overall household satisfaction with the water service is high, WTP is also expected to be higher. The same applies for the household perception of the current level of O&M.

Finally, community participation in the water scheme is expected to be a factor. This is indicated by the household estimation of the level of participatory decision-making within the scheme and the perceived ownership of the scheme itself. If the level of participatory decision-making is regarded as good, the households are expected to be more willing to pay. Meanwhile, if households perceive themselves or the community as the owners of the water scheme, they are expected to see themselves as having a stake in it, and therefore motivated to pay more. The case is the opposite, on the other hand, if the government or donor are perceived as the main owners of the water system.

5.1.3 Willingness to pay more and external factors in Nawalparasi and Palpa – Comparison

The factors introduced in the previous sector make it possible to look more closely at the conditions in the two districts. This comparison not only sheds light on the potentially significant differences between the two districts, but also reveals relevant details about each district individually. The comparison is presented in Table 5.6 below.

Table 5.6 Comparison of external factors between Nawalparasi and Palpa

	Palpa		Nawalparasi	
Factor	N	Percentage	N	Percentage
Gender Male	285	42 %	244	36 %
Gender Female	395	58 %	436	64 %
Literacy: Read and write	488	72 %	382	56 %
Literacy: Only read or neither	192	28 %	298	44 %
Caste: B/C/T	292	43 %	138	20 %
Caste: Janajati	380	56 %	414	61 %
Caste: Dalit	81	12 %	128	19 %
Caste: Madhesi	0	0 %	0	0 %
Caste: Other	0	0 %	0	0 %

Connection Public	651	96 %	490	72 %
Connection: Private	29	4 %	190	28 %
Pricing: Standard	310	46 %	338	50 %
Pricing: Meter or combination	20	3 %	148	22 %
Pricing: Other or don't know	350	51 %	194	29 %
Better Service: Reliable supply	81	30 %	98	43 %
Better service: Better quality	22	8 %	15	7 %
Better service: Better community tap	9	3 %	1	0 %
Better service: Private tap	134	49 %	93	40 %
Better service: Water flow and no leaks	26	10 %	23	10 %
Water quality wet season: Never or rarely good	100	15 %	257	38 %
Water quality wet season: Generally, mostly or always good	580	85 %	423	62 %
Water quality dry season: Never or rarely good	59	9 %	77	11 %
Water quality dry season: Generally, mostly or always good	621	91 %	603	89 %
Level of water services: Poor of very poor	98	14 %	101	15 %
Level of water services: Satisfactory, good or very good	575	85 %	571	84 %
Level of water services: Don't know	7	1 %	8	1 %
Participatory decision making: Poor or very poor	83	12 %	79	12 %
Participatory decision making: Satisfactory, good or very good	574	84 %	547	80 %
Participatory decision making: Don't know	23	3 %	54	8 %
Satisfied with current O & M: Yes	514	76 %	123	18 %
Satisfied with current O & M: No	166	24 %	553	81 %
Ownership: Me or family	14	2 %	29	4 %
Ownership: Community	580	85 %	363	53 %
Ownership: WUSC	16	2 %	57	8 %
Ownership: Government	33	5 %	57	8 %
Ownership: Donor	37	5 %	166	24 %
Ownership: Other	0	0 %	8	1 %
Spending priority: Water	7	1 %	75	11 %
Spending priority: Education	7	1 %	163	24 %
Spending priority: Healthcare	580	85 %	47	7 %
Spending priority: Food	16	2 %	384	56 %
Spending priority: Other	70	10 %	11	2 %

The external factors reveal rather significant differences between the regions. Firstly, all social indicators suggest that Palpa has a higher standard of living, at least in terms of education, caste and spending priorities. The district has a considerable higher percentage of full literacy than Nawalparasi (78% compared to 56%) and 43% of its population are Brahmin/Chhetri/Thakuri (as compared to 20% in Nawalparasi), which are the more affluent classes. If the assumption that spending priorities reflect income levels is maintained, these would also seem to be in line with the previous results: the respondents in Palpa strongly prioritized healthcare (85%) whereas in Nawalparasi the priority was on the even more urgent necessity items food (56%) and water (24%).

Despite this strong probability of a higher average income level in Palpa, the results from the previous section show that the average willingness to pay more for water is in fact lower than in Nawalparasi. This quite clearly suggests that WTP is at least not directly dependent upon income level. The reasoning behind WTP is more complex than merely a question of consumption possibilities.

Moreover, as the two tables below show, there is no dramatic difference in the answers to the WTP more question between different castes either in Palpa or Nawalparasi. The evidence is similar for the other social variables. This also suggests that income or other factors alone do not explain differences in WTP.

Figure 5.4

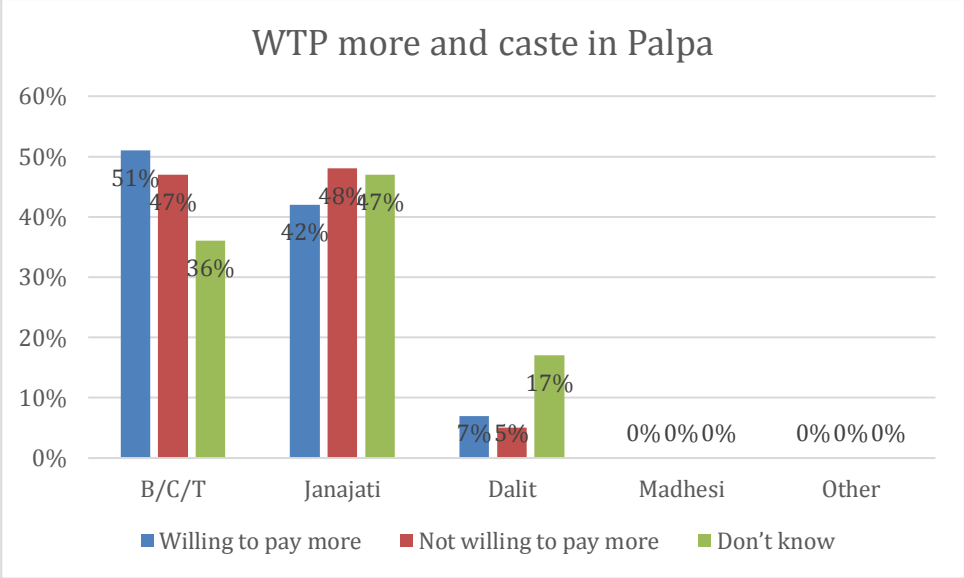
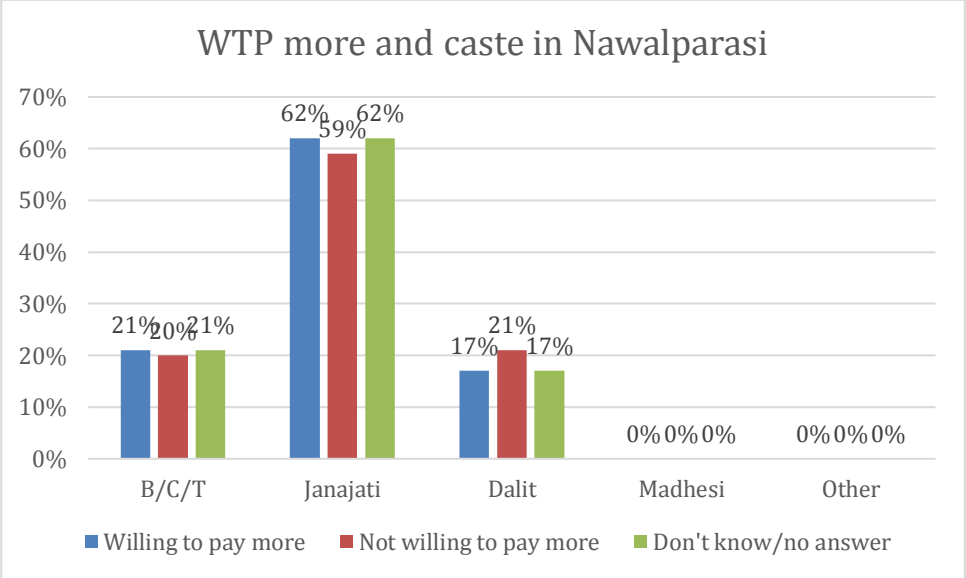


Figure 5.5



Big differences between the districts can also be observed when it comes to water system factors. In particular, the vast majority of the population in Palpa have a public connection (96%) and only 4% a private one. In Nawalparasi the share of private connections is notably higher (28%). Similarly, only 3% have metering in Palpa, as opposed to 22% in Nawalparasi. This would seem to be significant, because as was mentioned in section 5.1.3, a water meter and private connection both make it possible to control spending and pay exactly for the amount that has been used. A public connection with a fixed standard fee, on the other hand, may leave users feeling as if they are potentially paying for other users' share as well. Therefore, based on the data from Palpa and Nawalparasi, the question of private or public connection may be of key importance for WTP.

However, when looking more closely at the data from Nawalparasi (where share of private connections is larger and analysis therefore possible), it becomes clear that the respondents with a private connection were actually less likely to be willing to pay more for water (Figre 5.6). The same is true when comparing metered and standard fee connections (Figure 5.7). In other words, the previous hypothesis does not seem to hold: having a private connection seems rather to discourage than encourage willingness to pay.

Figure 5.6 Willingness to pay more and water connection in Nawalparasi

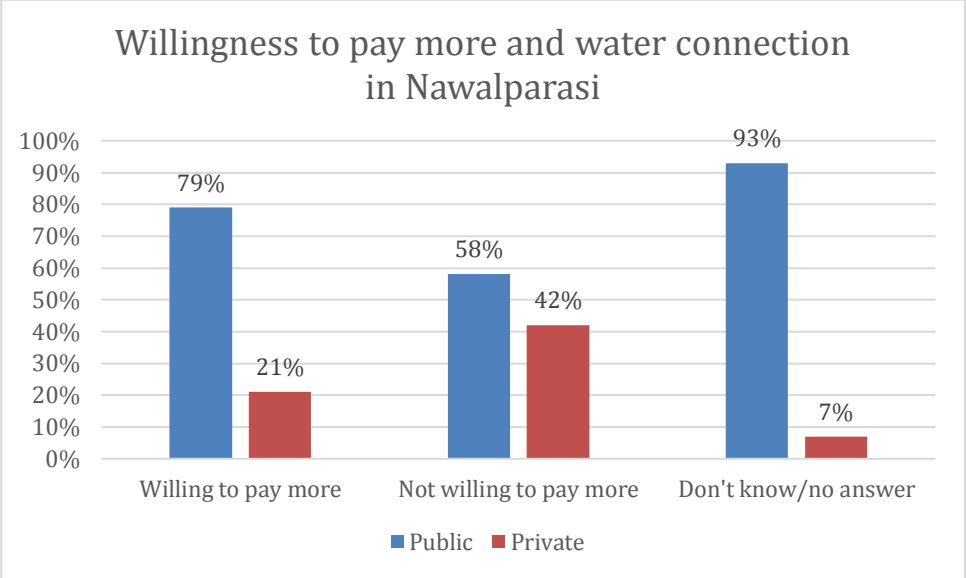
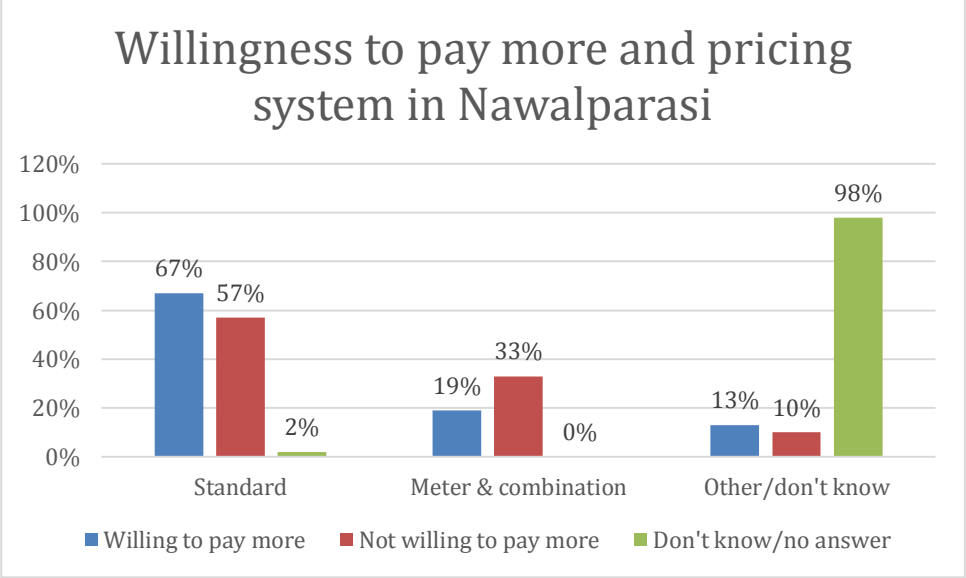


Figure 5.7

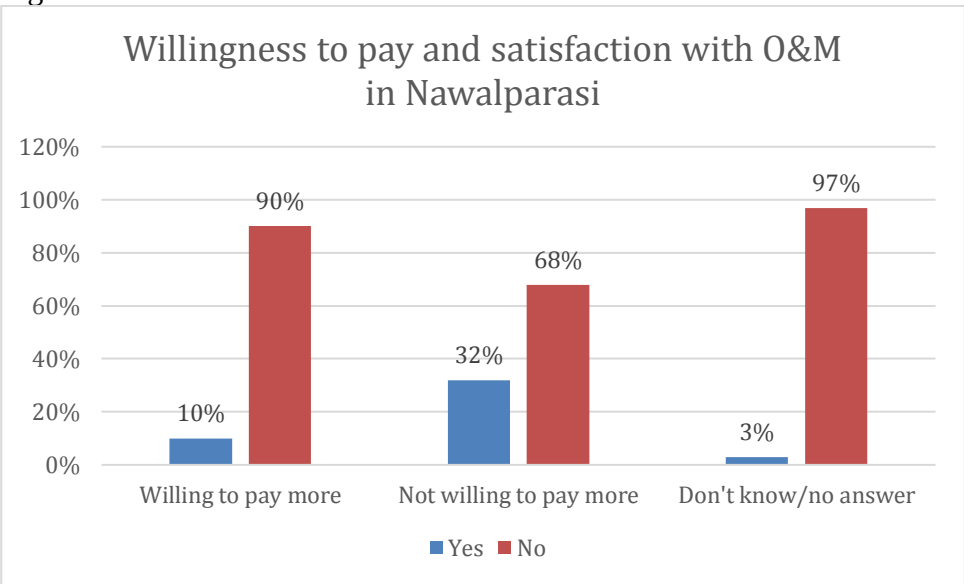


The functionality factors might shed some light on this finding, particularly the ones concerning preferred service improvement. The most popular choice in Palpa is the acquisition of a private connection (49%), which also in Nawalparasi gets the second place with 40% of respondents. Judging by this, the respondents are aware of the benefits of the private connection, and therefore willing to pay more in order to acquire one. The households that already do have a private connection are satisfied with the current service, and less willing to pay more as they do not expect this to bring such a significant improvement to the service. It should also be noted that the data here does not take into account the current price. It might already be higher in those schemes that have invested considerably into building private connections, thus discouraging willingness to pay even more.

Differences arise also with regard to water quality and O&M. Neither seem to be a big problem in Palpa, while in Nawalparasi 38% report the water quality to be poor in the wet season, and all of

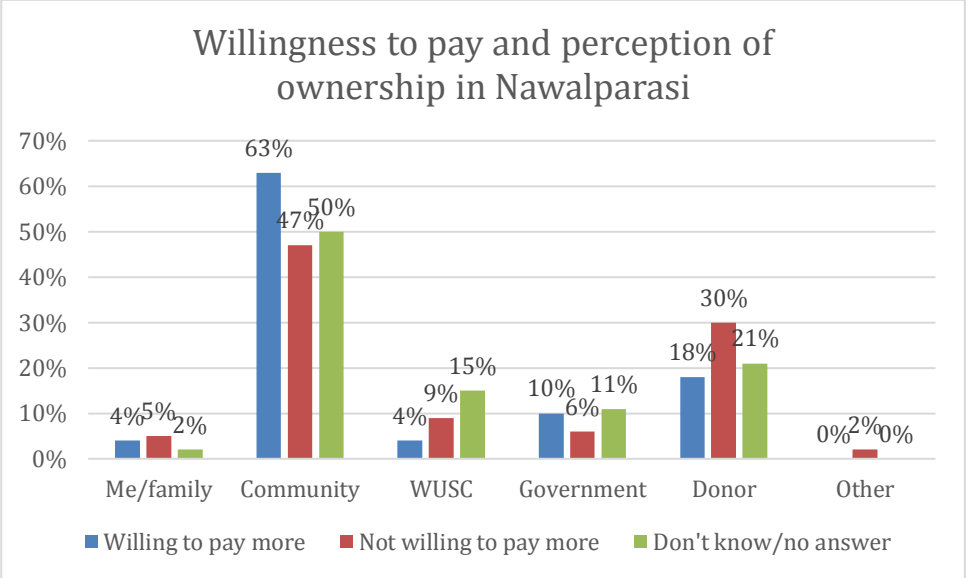
81% are dissatisfied with the level of O&M. A closer look shows that out of those willing to pay more in Nawalparasi, 90% were dissatisfied with O&M, compared to only 68% out of those not willing to pay more. This would also suggests that those not satisfied with some feature of the current service are, on average, more willing to pay more in order to improve it.

Figure 5.8



Finally, respondents in both Palpa and Nawalparasi are relatively satisfied with the level of participatory decision-making in their water schemes. In Palpa, 85% also agree with the statement that the water supply is owned by the whole community, which implies a sense of a shared resource. In Nawalparasi, however, only 53% agreed with this statement, and 24% considered the water supply to be owned by the donor. This is an interesting observation, as it usually is a very central objective of the donors to engender a sense of ownership of the water scheme into the community, and this has been seen as one of the pre-conditions for a sustainable system. It may also imply that the respondents feel that they are paying to the donor, rather than contributing to the community, which is further likely to decrease WTP. As Table 5.9 below shows, out of those not willing to pay more in Nawalparasi, 30% believed that water source was owned by donor, which is considerably more than out of those willing to pay more (18%). Based on this, the perception of ownership seems to be a factor behind WTP.

Figure 5.9



5.1.4 Willingness to pay more and external factors – regression analysis

Although the previous comparison gives some idea about the connections between external factors and WTP, actual correlations cannot be established based on cross-tabulation alone. Therefore, a basic regression analyses were performed on the data from Nawalparasi and Palpa, as well as data from the two districts combined. The idea was to find out whether there was any statistically significant correlation between certain factors and willingness to pay more. In addition, based on the regression analysis, the study aimed to formulate a model of several factors that would predict WTP as accurately as possible.

The hypotheses for the regression analysis are presented in Table 5.4 in section 5.1.2. Based on these expectations, regressions were performed on each factor separately for the data sets from Palpa and Nawalparasi. The results are shown in Table 5.7 below. The regressions were limited to those respondents who were willing to pay more. This decision was based on the high share of 'Don't know' and 'Not willing to pay more' responses, which in some cases made the regression impossible. In addition, this part of the study was primarily concerned with how different factors are likely to impact on willingness to pay more. 'Don't know' and 'Not willing to pay' answers were not considered to be relevant here.

As can be seen, there are some important differences between the districts. In Palpa, the majority of regressions were not statistically significant, and only 3 were. Meanwhile, for Nawalparasi, there are 12 statistically significant results. Some of the impacts for specific factors are also different for Palpa and Nawalparasi respectively. For example, very good water quality in the wet season seems to be significant for both regions, but the impact on WTP more is positive in Palpa and negative in Nawalparasi. In Palpa, it was not possible to perform a regression on the impact of private/public connection and meter/standard pricing system, as the share of private connections and metered pricing systems were so small. Meanwhile, in Nawalparasi it seems that caste, connection, pricing, water quality, satisfaction with O&M, perception of ownership and priority for spending all have some influence on WTP.

Table 5.7 Regression results for Palpa and Nawalparasi

Palpa			Nawalparasi		
Factor	Impact	Significant	Factor	Impact	Significant
Gender: Male respondent	Positive	**Yes**	Gender: Male respondent	Positive	No
Literacy: able to read and write	Positive	No	Literacy: able to read and write	Positive	No
Literacy: not able to read or write	Negative	No	Literacy: not able to read or write	Negative	No
Caste: Brahmin/Chhetri/Thakuri	Positive	No	Caste: Brahmin/Chhetri/Thakuri	Positive	**Yes**
Caste: Dalit or Janajati	Negative	No	Caste: Dalit or Janajati	Negative	**Yes**
Connection: private	N/A	N/A	Connection: private	Positive	**Yes**
Pricing: standard	N/A	N/A	Pricing: standard	Negative	**Yes**
Pricing: metering system	N/A	N/A	Pricing: meter	Positive	**Yes**
Preferred service improvement: Reliable supply	Positive	No	Preferred service improvement: Reliable supply	Positive	No
Preferred service improvement: Constant supply	Negative	No	Preferred service improvement: Constant supply	Positive	No
Preferred service improvement: private connection	Negative	No	Preferred service improvement: private connection	Negative	No
Water quality wet season: very good	Positive	**Yes**	Water quality wet season: very good	Negative	**Yes**
Water quality wet season: satisfactory to good	Positive	No	Water quality wet season: satisfactory to good	Negative	**Yes**
Water quality wet season: very poor or poor	Negative	No	Water quality wet season: very poor or poor	Positive	**Yes**
Level of water services: satisfactory to very good	Positive	No	Level of water services: satisfactory to good	Negative	No
Level of water services: very poor or poor	N/A	N/A	Level of water services: very poor or poor	Positive	No
Participatory decision-making: very good	Positive	**Yes**	Participatory decision-making: very good	Positive	No
Participatory decision-making: satisfactory to good	Positive	No	Participatory decision-making: satisfactory to good	Negative	No
Participatory decision-making: very poor or poor	N/A	N/A	Participatory decision-making: very poor or poor	N/A	N/A
Satisfaction with current O & M: Yes	Negative	No	Satisfaction with current O & M: Yes	Positive	**Yes**
Satisfaction with current O & M: No	Positive	No	Satisfaction with current O & M: No	Negative	**Yes**
Sense of ownership: Me/family	Negative	No	Sense of ownership: Me/family	Positive	No
Sense of ownership: Community	Positive	No	Sense of ownership: Community	Negative	No
Sense of ownership: Water Committee	Positive	No	Sense of ownership: Water Committee	Negative	No
Sense of ownership: Government	Negative	No	Sense of ownership: Government	Negative	No
Sense of ownership: Donor	Negative	No	Sense of ownership: Donor	Positive	**Yes**

Priority for spending: Water	Negative	No	Priority for spending: Water	Negative	**Yes**
Priority for spending: education	Negative	No	Priority for spending: education	Negative	No
Priority for spending: healthcare	Positive	No	Priority for spending: healthcare	Negative	No
Priority for spending: food	Positive	No	Priority for spending: food	Positive	**Yes**

Based on these results, the households in Nawalparasi appear to be more responsive to changes in various conditions when it comes to willingness to pay. However, as was observed in section 5.1.1, 81% of households are currently paying a price for water, compared to only 47% in Palpa. It is possible that households in Nawalparasi are simply more accustomed to paying for water, and therefore also more willing to pay more.

Overall, there were relatively few statistically significant results. For those that were, it is interesting to see how they correlate with the initial hypotheses introduced in Section 5.1.2. For example, for very good water quality in wet season, which was the only factor that had a statistically significant impact in both districts, the impact is positive in Palpa and negative in Nawalparasi. This would suggest that respondents in Palpa are satisfied with the service and therefore willing to pay even more for it, as the initial hypothesis predicted, whereas in Nawalparasi respondents perhaps do not see any reason for improvement and therefore for paying a higher price either. This corresponds in Nawalparasi with the fact that bad water quality in wet season has a positive impact (also statistically significant) on willingness to pay more. The respondents thus apparently believe that a higher price would be used to provide a better water quality.

On the other hand, when it comes to the current O&M of the scheme, there now is a significant positive impact in Nawalparasi when households are satisfied and a significant negative impact when households are dissatisfied, implying that the respondents are willingness to pay more only for a well working service. However, this may be affected by the large share overall of dissatisfaction with O&M in Nawalparasi, as can be seen from Table 5.6. For Palpa, the impact is negative but not statistically significant.

In Nawalparasi caste also seems to be an important factor for WTP. The impacts are as expected: positive for a higher caste and negative for lower. For spending priorities in Nawalparasi the situation was less clear: for households that reported water as a priority the impact on WTP was negative, as expected, but when food was the priority the impact was positive. The latter result was unexpected and difficult to explain on the basis of the survey data. In Palpa, gender was also a significant factor that had a positive impact on WTP, as expected in the hypotheses. For Nawalparasi gender was not a significant factor.

Water connection and pricing mechanism were also important significant factors in Nawalparasi. As expected, both private connection and a metering system had a positive impact on price. Neither produced any results in Palpa, probably due to the small share of households that reported either system.

Finally, a good level of participatory decision-making had a statistically significant positive impact in Palpa but not in Nawalparasi. Meanwhile, the perception of donor as owner of the water source had a significant but unexpectedly positive impact on WTP in Nawalparasi. This is another interesting observation that is difficult to explain on the basis of the survey data alone.

The factors were grouped in order to build a model that would predict the willingness to pay more as accurately as possible. The group regressions were tested first on the data from the two districts separately and then on pooled data consisting of both Nawalparasi and Palpa.The results for the separate data that did produce statistically significant analyses are presented in Tables 5.8 and 5.9 below.

Table 5.8 WTP models for Nawalparasi

Nawalparasi			
	Factors	**Impact**	**Significance**
Social factors	**Male**	Negative	No
	Literate	Positive	No
	Caste B/C/T	Positive	Yes
	Factors	**Impact**	**Significance**
Water system	**Private**	Positive	Yes
	Satisfied O&M	Positive	No
	Metering	Negative	Yes
	Factors	**Impact**	**Significance**
Satisfaction	**Quality wet: Very good**	Negative	No
	Service: Very good	Positive	No
	Participation: Very good	Positive	No
	Ownership: Donor	Positive	Yes

Table 5.9 WTP models for Palpa

Palpa			
	Factors	**Impact**	**Significance**
Satisfaction	**Quality wet: Very good**	Positive	Yes
	Service: Very good	Negative	No
	Participation: Very good	Positive	Yes
	Ownership: Community	Positive	No

As can be seen, only a few of the factors in any of the models are statistically significant. Although these are the previously mentioned ones, like caste, private connection, metering and ownership for Nawalparasi as well as water quality and participation for Palpa, these still fail overall to produce reliable, accurate models. In addition, the R^2 test yields very low figures that further suggest the models are of questionable value. R^2 may not be the best one in this case where the aim is to find relationships between variables, values that generally are as low as 0.036 still give some idea about the fitness of the model.

In order to see whether this drawback could be overcome, the data from Palpa and Nawalparasi were pooled together into one set combining those willing to pay more from both districts. The idea was that a larger sample would produce a greater amount of valid data and therefore more accurate models. The results for all statistically significant analyses are presented in Table 5.10 below.

Table 5.10 WTP models for Palpa and Nawalparasi combined

	Factors	**Impact**	**Significance**
Social factors	**Male**	Positive	No

	Literate	Positive	No
	Caste B/C/T	Positive	Yes
	Factors	**Impact**	**Significance**
Water system	**Private**	Positive	Yes
	Satisfied O&M	Positive	No
	Factors	**Impact**	**Significance**
Water service	**Preferred service: reliable**	Positive	Yes
	Preferred service: quality	Negative	No
	Preferred service: private	Positive	No
	Factors	**Impact**	**Significance**
Satisfaction	**Quality wet: good**	Negative	Yes
	Service: good	Negative	No
	Participation: good	Positive	No
	Ownership: Government	Negative	No

As can be seen from the table, the pooled sample yields equally few significant factors. Caste, private connection, reliability as preferred service improvement and very good water quality still remain significant. However, none of the group models alone provides a very reliable prediction for willingness to pay more. Even combining all the significant factors into one model does not provide better results, as Table 5.11 shows.

Table 5.11 Combined WTP model for Palpa and Nawalparasi

Factors	**Impact**	**Significance**
Caste B/C/T	Positive	Yes
Private connection	Negative	No
Preferred service: reliable	Positive	No
Water quality: very good	Positive	Yes

5.1.5 Water fees and sustainability

Although it has not been the aim of this study to examine the impact of water fees on sustainability as such, some very basic points can be drawn from the data that quite clearly appear to be supporting the case for water fees. For example, in both Nawalparasi and Palpa, the share of households satisfied with O&M was visibly larger for those who were also currently paying a water fee (Table 5.12). This implies that the schemes with water fees on average have a better level of O&M.

Table 5.12 Implementation of water fee and satisfaction with O&M

Nawalparasi			**Palpa**		
	Satisfied O&M	**Not satisfied O&M**		**Satisfied O&M**	**Not satisfied O&M**
Fee	22 %	73%	**Fee**	85 %	15 %
No fee	6 %	94 %	**No fee**	67 %	33 %

In addition, it should be noted that a vast majority of households in both Nawalparasi and Palpa agree that a water fee is acceptable. As Table 5.13 below shows, 88% in Nawalparasi and 85% in Palpa are in support of water fees. This suggests that the concept of water fees is already relatively well accepted and the associated benefits recognized in these two districts.

Table 5.13 Acceptance of water fees in Nawalparasi and Palpa

Nawalparasi		**Palpa**	
Fee ok	**Fee not ok**	**Fee ok**	**Fee not ok**
88 %	12 %	85 %	15 %

5.1.6 Discussion

The previous analysis reveals some interesting details as well as larger trends with regard to willingness to pay for water. These are highly beneficial for understanding the overall economic sustainability of water schemes and for discerning relevant background factors.

It is important to note that less than half the households were willing to pay more for water: 34% in Nawalparasi and 40% in Palpa. However, the acceptance of water payments overall was high at around 85%. In Palpa, the large share of Don't know/No answer responses is likely to be linked to the fact that only 47% of the households there are currently paying a tariff (compared to the 81% in Nawalparasi). This poses some problems for the analysis as it leaves a relatively small sample of data in Palpa. On the other hand, this is a difficult issue to fix, as adding data from another district, for instance, would potentially only increase the variability of the water schemes and thus complicate the analysis.

Indeed, it seems quite impossible to determine any general price for water that would be ideal either in both districts or in all schemes. The individual schemes are so different from one other, each with its own characteristics and solutions, that each also needs a unique price level. This, however, is not really what the study set out to do in the first place and does not mean that water fees as such are a bad idea, as Section 5.1.5 above implies.

In addition, in both Nawalparasi and Palpa the average total WTP is higher than the current price. In other words, at least in some schemes water in undervalued at the current price, and households would be willing to pay more as long as this would ensure a better service. However, this applies only to some schemes, while in others practically none of the households would be willing to pay more.

It would seem, on the other hand, that assumptions about the factors affecting WTP cannot be made on a purely intuitive basis. For example, when comparing Nawalparasi and Palpa, the latter seems to have a better standard of living and education levels based on the survey results on variables like literacy and caste. This could rationally imply a more sophisticated level of water systems as well. However, the share of private water connections, which tend to be better valued than public ones, is negligent in Palpa, while it is 28% in Nawalparasi.

All of this demonstrates the utter importance of local knowledge and data on local conditions when decisions and calculations on water fees and sustainability are made. If the idea is to contribute to the economic sustainability of a scheme, water fees cannot be based merely on the tariffs used in

another nearby scheme, for instance. Moreover, while fee rates may be quite easily changed if they prove to be inefficient, other decisions for example on investments in new connections may be impossible to cancel and have considerable consequences on the overall economic performance of the scheme.

These observations set a two-fold responsibility for international cooperation actors working either to construct new water schemes or to improve the sustainability of existing ones. On the one hand, it is necessary to make sure that knowledge from the local level is heard and the individual features of each community addressed. On the other hand, it is important to ensure that local conditions are sufficiently probed and to provide technical support for research and planning.

As to which factors are the ones that influence willingness to pay more for water, the analysis gives several insights. For one, the difference between private and public water tap seems to be of key importance. This factor is mainly possible to detect in Nawalparasi, where the share of and perhaps also knowledge about private taps is higher. However, a large share of households in both districts reported private connection be the preferred service improvement that they would be willing to pay more for.

Very good water quality is the only factor that is statistically significant in both districts, but its impact is positive in Palpa and negative in Nawalparasi. This suggests that households in Palpa are happy with the service and therefore willing to pay more, whereas in Nawalparasi the good service seems rather to translate into not seeing any reason to pay more. Either way, it is clear that the same factor may have different kinds of impacts.

O&M also seems to have an impact, at least when a considerable majority of households think it is unsatisfactory. This may imply that in the case of O&M, the problems are perceived to be so fundamental and wide-ranging that merely charging a higher price would not fix them. It may also be an indication of some degree of distrust in the way the local WUSC is handling things.

The quality of water services and participatory decision-making were both considered satisfactory, good or very good by at least 80% of households in both Palpa and Nawalparasi. In Palpa, satisfaction with decision-making had a positive impact on willingness to pay more. Thus it remains unknown whether a more general dissatisfaction with service or decision-making would have a more significant impact on WTP more.

The final but very relevant point is the impact of perception of ownership. In particular, in Nawalparasi an exceptionally large share of households consider the water source to be owned by the donor; that is, the agency that originally built or contributed to the building of the scheme. This has a statistically significant positive impact on willingness to pay more. The result is unexpected in two ways. First, the prevalence of perceived donor ownership is exactly contrary to the common policy of development cooperation actors, who usually are trying to encourage community ownership. It seems that in Nawalparasi this has not succeeded very well. In addition, it might be expected that the perception of donor ownership would rather have a negative impact on willingness to pay, as households would not want to pay so much for a service that is not considered to be their own. The positive impact may imply a confidence that the donor will take responsibility of – and contribute financially to – the running of the scheme.

In Palpa, 85% consider the water source to be owned by the community. This is an important point in itself, if community ownership is to be fostered. It should therefore be carefully considered what

has been done differently in Palpa and Nawalparasi – or what otherwise is different between them – that has led to such a significant contrast in the local perceptions.

Some of the findings of the statistical analysis are significant as such, while others raise further questions rather than give answers. The final part of this study will therefore look closer at two schemes in particular and combine the findings from the case studies with those of the statistical analysis.

5.2 Case studies

As the previous section shows, statistical analysis can only scratch the surface of the dynamics behind willingness to pay for water, especially in the case of such varied arrangements as in Nawalparasi and Palpa. Yet the aim of this study is to also understand the background factors and specific features that affect the arrangements in each scheme and VDC; that is, precisely those features that tend to remain hidden within the statistical data. Therefore, two case studies were chosen to illustrate more detailed characteristics of the water supply systems. It should be noted that these two cases are not in any way representative of Nawalparasi and Palpa; in fact, due to practical limitations it was only possible to visit schemes in Nawalparasi. The case study analysis will therefore at best aim to further illustrate some of the characteristics in the field that could additionally affect willingness to pay and the economic sustainability of the schemes, and thus to provide potential topics for further study.

The aim was to choose two schemes that both applied water tariffs and that reported a reasonable percentage of responses to the 'How much more would you be willing to pay for water' question in the field assessment survey, but would be otherwise relatively different for example in terms of geography, accessibility and practical arrangements. The two chosen schemes, Ramnagar and Jousimajhuwa, were visited during a field trip in April 2015.

Ramnagar VDC is situated in the Terai, near the Nawalparasi district capital. It is on the East-West Highway, meaning that there is an all-weather road enabling access. The Ramnagar Water Supply and Sanitation scheme covers Wards 1, 5 and 6 of Ramnagar, serving about 1000 households altogether. It was built in the Phase III of the RWSSSP Project, which lasted from year 1999 to 2004. The Jousimajhuwa WSS is in the VDC of Dedgaun, where it covers wards 6, 7 and 8. It covers about 155 households, and was built in the first phase of the RWSSSP project (1990-96). Dedgaun is located in the hills without road access during the rainy season.

Some key characteristics of the two schemes that influenced the case selection are reported below in Table 5.14. As it shows, they are relatively different at least when it comes to overall conditions. The topography differs, as does accessibility (illustrated by the presence or lack of a road). Although both are listed as 'large' schemes as they have more than 150 households, Ramnagar is in fact considerably bigger than Jousimajhuwa. There also are some considerable differences when it comes to the financial arrangements, regarding the tariff and its payment rate, for example.

Table 5.14 Comparison of Ramnagar and Jousimajhuwa water schemes

Scheme name	Topography	Size	Av WTP more (NPR)	Av current price (NPR)	Weather road	Water quality	Adequacy of tariff	Tariff basis	Functionality	Tariff payment %
Jousimajhuwa	Hill	Big	87, 50	30,00	No	Not under NDWQS/WHO standard	Adequate	Only VMW	Needs major repair	100
Ramnagar	Terai	Big	231,11	43,53	Yes	Under NDWQS/WHO standard	Not adequate	VMW & repairs	Needs rehabilitation	60

The main questions of interest were those that the statistical analysis clearly could not answer. When it comes to willingness to pay for water, it is interesting to look deeper into the causal factors that could be loosely traced. In addition, the quantitative case analysis allows for a more detailed discussion of the relationship between willingness and water scheme sustainability. In particular, questions about private and public connections, adequacy of water and social equality will be addressed.

The following analysis will look at five different aspects of water management in WUSCs, attempting to cover issues affecting sustainability as conclusively as possible. The focus will be on the local level, but will take into account the influence of national policies and district administration involvement where relevant, as well as the role of international cooperation. The analysis is based on interviews conducted in Ramnagar and Jousimajhuwa with the WUSC members, technical personnel and local households, as well as on materials from meetings with different levels of administration.

5.2.1 Governance – Local, national or transboundary?

As has been pointed out for example by Haapala et al. (forthcoming), WUSCs are an established institution in Nepal, and have been described as well organized. However, it seems that their performance with maintaining the water schemes is not always entirely successful. As mentioned above in Section 2.2, about 43% of the water schemes are not fully functional (Government of Nepal 2011). This corresponds with the findings of the NAPA WASH survey in Palpa and Nawalparasi, where 81% of the WUSCs reported that their schemes were not functional without external repair assistance. Although reasons behind such problems can be various, it can be assumed that the governance of the WUSCs has at least not been able to fully address them.

The case study schemes also had problems with functionality; some were coinciding, but each also had one or two major issues that were considered especially harmful. In Ramnagar the main concern was about water scarcity, while in Jousimajhuwa the problem was more about water quality and an unequal access to water across the community.

The field analysis suggested that continuity and expertise are important. In both Ramnagar and in Jousimajhuwa WUSC members pointed out that that their tasks were demanding and time-consuming, and it was difficult to attract newcomers to do them. On the other hand, new members often did not know what they were doing and therefore ended up making bad or short-sighted decisions. WUSC members called for better opportunities for training and education for the WUSC members (Interview with WUSC, Ramnagar, 12 April 2015; Interview with WUSC, Jousimajhuwa, 15 April 2015).

Local politics and internal controversies also come into play and may lead to very misinformed and unwise investments. According to the WUSCs of both case study schemes, connections and political conflicts sometimes influence the choice of WUSC members (Interview with WUSC, Ramnagar, 12 April 2015; Interview with WUSC, Jousimajhuwa, 15 April 2015). This was also noted as a relatively common phenomenon by a government level official at the Department of Water Supply and Sewerage (DWSS) (Interview at DWSS 9 April 2015).

At least in the case study schemes, the importance of knowledge, training and counselling can be discerned as top priorities. While WUSC members of both schemes confirmed that some training was included as a part of the construction of the water scheme in the beginning, they also pointed out that opportunities for such guidance later on were very limited. They also argued that they had received either no or very few instructions, guidelines or guidance services from the district or national administrations (Interview with WUSC, Ramnagar, 12 April 2015; Interview with WUSC, Jousimajhuwa, 15 April 2015). Such developments also present considerable losses of investment which affect the economic sustainability of the scheme.

With regard to the higher levels of governance overall, the study found that their influence is rather small and in some cases even adverse. For example, at least in the experience of Ramnagar and Jousimajhuwa no formal monitoring or oversight was carried out by national or district authorities. National officials also confirmed that they have insufficient resources for this (Interviews at DWSS and Rural Water Supply and Sanitation Fund Development Board (FUND Board) 9 April 2015, Interview at Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) 20 April 2015).

The lack of monitoring is a critical shortcoming as it, in effect, renders a lot of the nation-wide recommendations, strategies and policies very weak. Especially in the complicated governance structure of Nepal, it is difficult to enforce any measures in the absence of an effective follow-up and review mechanism. Monitoring is also important from the point of view of guidance and instruction in situations where local governance runs into problems. Similarly, it should be an important tool for the higher administrative levels to gain information in order to review their own policies. As previous research has shown, national administration also needs to be adaptive and responsive in order to be effective (Rautanen, van Koppel & Wagle 2014, 175).

The different administrative bodies seemed also to have problems in the coordination between one another when it comes to for example decisions about building new schemes. The involvement of the DDC was also criticized by the WUSC members of the two case schemes for not always treating different schemes equally with regard to financial support. In particular, the WUSC representatives claimed that all administrative levels were reluctant to fund schemes that originally were constructed by foreign donors, such as both Ramnagar and Jousimajhuwa, on the pretext that these should continue to be at the responsibility of the initial donor (Interview with WUSC, Ramnagar, 12 April 2015; Interview with WUSC, Jousimajhuwa, 15 April 2015). Thus external assistance may end up placing the schemes in a severely unfavourable position.

The above example also highlights the role of international cooperation in local water governance. Firstly, there is the issue that external financing seems to be a disadvantage for seeking support from the national or district levels. To some extent, the international agencies are forced to deal with governance such as it is and need to grapple with similar obstacles as the local actors are facing. Therefore, they need to do their best to make sure all levels of administration are not only

involved in the sense of allowing a given project to take place, but also are at least relatively aware of the goals and expected impacts for the project and able to see the potential benefits and synergies for their level. From a financial point of view, it should be taken care of that one form of assistance does not fully exclude some others. It doesn't help that international cooperation is usually carried out on a project basis, which does not necessarily favour the promotion of long-term goals such as governance. However, the Ramnagar case shows that the kind of long-term engagement demonstrated by the Finnish development cooperation in the region may also raise new kinds of issues, such as an excessive dependency on the external assistance.

Overall, the case studies suggest that local water governance takes place in a complex framework of governance structures and power relations. Each level is more or less dependent on the others, which creates an uneasy balance of power in which any actor may, intentionally or unwittingly, end up holding back the aims of another. As a result, interventions that only target one level of governance are likely to only ever gain limited success.

5.2.2 Economic structure

Some basic financial indicators of the Ramnagar and Jousimajhuwa schemes are presented in Table 5.15. These are still based on the survey results. It should also be mentioned that both schemes are implementing a water tariff and have an O & M fund. In addition, they both include private taps as well as public ones, and in Ramnagar these actually are more common than public taps.

Table 5.15 Financial indicators in Jousimajhuwa and Ramnagar (monetary sums in NPR)

	Mode of tariff collection	**Current tariff for public tap**	**Current tariff for private tap (minimum /month)**	**Current tariff in HH survey**	**Volume of O&M fund**	**O&M fund collected last year**	**O&M fund used last year**	**Total revenue last year**	**Total expenditure last year**
Jousimajhuwa	Metering	30	5000	30	11000000	0	0	426000	200000
Ramnagar	Per household	0	7000	43,53	1000000	384000	62000	1398000	1918000

On the basis of the survey results, the financial structure in both Jousimajhuwa and Ramnagar seems relatively secure and stable, at least when comparing to the many schemes that do not even have a water tariff. Not only are both schemes implementing the tariff and gaining revenue from it (although with some problems in the tariff collection rate in Ramnagar as Table 5.14 above shows), they have also managed to maintain a reasonably large fund for operation and management. Yet this degree of financial stability does not appear to have led into functional sustainability. Table 5.22 shows that according to the survey, Jousimajhuwa is in need of major repair and Ramnagar of full rehabilitation. The survey questions do not provide an answer to the question why the financial structure has not been enough to maintain the scheme in a fully functional condition. This is something that the field research data aims to contribute to.

In part, the deficiencies in functionality are likely to be connected to the age of the schemes. This is a factor especially in Jousimajhuwa, which is about 20 years old and thus at the end of its expected life cycle. Ramnagar, at about 10 years, is also coming close to the end of its lifetime. However, the idea at the time of the construction of the schemes has hardly been that they would simply run until the end of their life cycle and then be completely finished with no plan for continuation.

Firstly, the field data suggested that functionality problems are not simply due to issues like non-payment of the water tariff since, as in Ramnagar where the tariff collection rate is only 60%. According to both the households and the WUSC representatives, this is mainly because of water cuts: when no water is available, nothing can be expected as a payment either. However, the repairs needed to rehabilitate the schemes are so large that tariff payments alone will not be able to cover them even if they were raised and diligently paid. (Interviews with households and WUSC, Ramnagar, 12 April 2015).

Ramnagar does also have an O&M fund that was based on an initial investment of 1 million NPR, which was required at the time of the construction of the scheme and was collected from the community. It has been kept in the bank with a 7% interest, and is considered the emergency buffer. The WUSC policy is the that the interest on this investment can be used for repairs. However, it seems that external events like flooding take place almost every year, meaning that a considerable amount of the O&M fund needs to be reserved for preparation for those (Interview with WUSC chairperson, Ramnagar, 11 April 2015). One option would be to follow the example of Jousimajhuwa, where the initially invested O&M fund has been made available to the local community as small loans. Although the interest is very high at 30%, the loans have become very popular and default is very rare. It perhaps helps that the loan period is relatively short, usually one year, and the amounts small. According to the WUSC representatives, the loans have become an important enabling factor to the local community, while also contributing to the O&M fund (Interview with WUSC, Jousimajhuwa, 15 April 2015).

The construction of private taps is another important issue from the financial point of view. They have two effects: on the one hand they generate income due to the initial investment that the household has to make to acquire a private tap from the scheme and on the other hand, they make it possible to charge a tariff based on actual consumption, making tariff collection easier and potentially increasing revenue (Interview with WUSC, Ramnagar, 12 April 2015).

Yet they do also pose some problems. The Ramnagar scheme has fully switched to private taps and therefore discontinued public taps. The WUSC representatives explained that this was done because the public taps were used in a wasteful and irresponsible way (Interview with WUSC, Ramnagar, 12 April 2015). However, some households did not have the means to invest in a private tap, and were therefore left with no water connection at all (Interviews with households, Ramnagar 12 April 2015). This, obviously, is very harmful for the equality and stability within the community, as will discussed in more detail in Section 5.2.4. In addition, the construction of private taps as a source of income to the scheme is likely to be a rather short term solution. This is because private taps have already raised the consumption of water, thus further worsening the water shortage mentioned above. By building more taps, the scheme can only raise revenue for a short while but with the consequence of increasing water cuts (Interview with WUSC, Ramnagar, 12 April 2015).

Although neither scheme can be accused of poor management of finances, the current reality is that neither is fully economically sustainable on its present revenue. Raising the tariff will also not do much to improve the situation. The only option seems to be to seek external help, either from VDC, DDC or the government, or from an international source. This also explains the conviction of the WUSC members especially in Ramnagar that the original donor should provide the funding for rehabilitation. However, such dependency on external financing considerably undermines the original idea of independently sustainable water schemes. It also leaves the WUSCs at the mercy of funding decisions made by the higher administrative levels that may, in the worst scenario, be based on personal connections or corrupt practices.

Ramnagar and Jousimajhuwa would both benefit from exploring new financial mechanisms, such as a more elaborate loan basis. Another alternative is the cooperative structure, which has been applied in some parts of Nepal with some success (Simkhada 2013). In addition, the experience of the two case study schemes raises some questions for international cooperation agencies with regard to the establishment of the financial structure in the WUSCs. In particular, it is important to understand that it is not necessarily enough to merely implement a tariff and start an O&M fund. The system should be followed up and additional financial arrangements considered if sustainability cannot be achieved. This would also require some post-implementation activities from the donor in the form of monitoring and evaluation missions.

5.2.3 Ownership

As was mentioned above in Section 5.1.3, survey results show that in Nawalparasi only 53% of the households think that the water source of the scheme is owned by the community, and all of 24% think it is owned by the donor. As community ownership has been an important feature of the RWSSSP, this seems to be a shortcoming.

The interviews with WUSC representatives in both case study schemes support the view that there are some weaknesses in the degree to which ownership has been adopted by the communities. Especially in Ramnagar, it was very strongly argued that the after implementation the Finnish project had "just left", leaving the WUSC to cope on its own (Interview with WUSC, Ramnagar, 12 April 2015). The perceived need for continued assistance seems to be closely connected with the lack of access to other sources of financial support. As was discussed in Section 5.2.1, very little financing is available from the VDC, DDC and government (Interview with WUSC, Ramnagar, 12 April 2015; Interview with WUSC, Jousimajhuwa, 15 April 2015).

This leaves the WUSCs in a rather awkward situation. On the one hand, the external donors stipulate them to take ownership and be responsible for the management of the scheme after project implementation has ended. On the other hand, when the WUSCs run into financial or functionality problems, which easily due to lack of funds for larger investment as was discussed in Section 5.2.2, they have no source of support available. This, in turn, leads to far bigger functionality problems and makes the schemes unsustainable.

The WUSC representatives in Ramnagar themselves offered some solutions to this pattern. According to them, the schemes should be run jointly by the WUSC and the donor for some years after completion, before leaving the responsibility fully to the community. This would enable both parties to have an understanding about what is needed to make the scheme sustainable, and it would allow training and adaptation of practices if needed. In addition, the WUSC members suggested that the donor should monitor schemes and, if necessary, interfere with unsustainable practices (Interview with WUSC, Ramnagar, 12 April 2015).

It seems, therefore, that while the WUSCs in the case study schemes have taken up ownership in the sense that they are managing day-to-day functions and implementing financial arrangements, they fall short of having assumed a full sense of final responsibility for the functionality of the scheme. In other words, they are able to run the basic functions of the scheme on their own, but when it comes to bigger problems, such as environmental emergencies or the need to fully rehabilitate the scheme, they still look for external assistance as the first solution. For full ownership to be possible, however, the schemes should also have adequate financial resources, so ownership and economic sustainability clearly go hand in hand.

It is not only at the local level that ownership is deficient, however. As was discussed above in the previous sections, the VDC, DDC and governmental levels all eschew responsibility, arguing that donor-funded schemes should be at the responsibility of the donor. The problem is that sound water governance usually requires some involvement by all levels, thus yielding some liability also to them. It is also unlikely that international cooperation programmes would be operating on the assumption that all responsibility after project implementation will or can be carried solely at the local level. For example, Phases II and III of RWSSSP worked in close cooperation with the DDC level and the Ministry of Local Development (Finnish Ministry for Foreign Affairs 1998). According to governmental officials themselves, there formally is a ladder of responsibility where the WUSC and VDC carry the direct responsibility but if they are not able to solve the problem, DDC and the responsible central level institution are supposed to give their support (Interviews at DWSS and FUND Board 9 April 2015).

Yet at least according to the WUSCs in Ramnagar and Jousimajhuwa, the DDC and central bodies are not quite assuming their responsibility. As was discussed in Section 5.2.1, the different levels of administration tend rather to blame each other for any shortcomings. The officials from DWSS and DoLIDAR were also all careful to emphasize that WUSCs are independent bodies over which national administration has little control (Interviews at DWSS 9 April 2015 and DoLIDAR 20 April 2015).

5.2.4 Equality of access

Equal access most obviously refers to access to water supply, taking into account issues such as water quality and connection type. However, in the case of water governance, it should also consider access to decision-making and participation within the community.

One major access problem in Ramnagar and Jousimajhuwa revolves around private and public connections. This is visible especially in Ramnagar, where the decision to discontinue public taps has led to some households losing their water supply altogether. Although the focus on private taps makes financial sense, this decision obviously has placed a part of the community in an intolerable situation, leaving them without a safe water source and dependent on well water for all activities including drinking. Although it only concerns a very small minority, it is clear that the situation cannot go on if the community wishes in any way to be inclusive towards all of its members. This is especially controversial as the excluded households have contributed through labour to the construction of the original scheme (Interviews with households, Ramnagar 12 April 2015).

The view shared by most local people seems to be that everyone should be ensured to have access to water while also contributing to the scheme to the extent possible (Interviews with households, Ramnagar 12 April 2015). These two issues were almost always linked together, suggesting that there is a sense of shared responsibility but also a recognition of the different circumstances of community members. The same view seems to be held by the WUSC representatives, who emphasized the importance of taking into account the situation of impoverished households in all planning (Interview with WUSC, Ramnagar, 12 April 2015). At least so far, however, no measures had been taken to improve their conditions, which does not give the impression that a solution will be come up with very fast.

In Jousimajhuwa, the major equality problem concerned a slightly isolated cluster inhabited mostly by members of the Darai minority. The households within the cluster have very poor water supply with recurring cuts and weak water flow. Some of the households have no water supply at all. No party suggested that the minority position of the inhabitants played any crucial part in the occurrence of the water shortage. However, at least the isolated position of the cluster may have affected the lack of efficiency with regard to fixing the issue. The WUSC members argued they were aware of the problem and working on it (Interview with WUSC, Jousimajhuwa, 15 April 2015), yet the cluster households claimed the situation had stayed the same for a long time. In fact, they said they had tried to solve the problem by acquiring a new pipe which could have replaced the apparently blocked connection to the cluster. However, the WUSC had decided to use this pipe to fix another broken pipe near the water source of the scheme (Interviews with households, Jousimajhuwa, 15 April 2015). Although this repair apparently also was urgent for the functionality of the entire scheme, the procedure has not helped to spur confidence within the Darai cluster that their concerns are being heard.

The access problems affect a relatively small minority in both case study schemes, but this doesn't make the need to deal with them any less urgent. This is all the more important as the lack of access primarily affects those in a marginalized position in both cases. At the same time, the examples show that economic and social standing do still play a role in access to water.

Equality and access are not only relevant at the local level, however. In fact, both DDC and national ministries can have a considerable influence on participatory water governance. One obvious example of this is the lack of access to funding from district and national administration experienced by both Ramnagar and Jousimajhuwa. According to WUSC members, schemes were not equal in terms of financing; instead, personal connections were claimed to play a part (Interview with WUSC, Ramnagar, 12 April 2015, Interview with WUSC, Jousimajhuwa, 15 April 2015).

The aim of international cooperation actors usually is to alleviate problems in equality and access. In the case of Ramnagar and Jousimajhuwa this seems to have succeeded relatively well despite the remaining issues pointed out above in this section. Equality was one important element in the RWSSSP, especially targeting the inclusion of marginalized people and equality between sexes (Finnish Ministry for Foreign Affairs 2003). While it is not the aim of this study to find out the extent to which the accomplishments in the case study schemes can be claimed to be a direct result of the project, it seems very likely that the equality approach has at least been one influence shaping the development in the community.

Overall, equality is crucial from the point of view of both justice and conflict. In both Ramnagar and Jousimajhuwa, there seemed to be a relatively commonly shared understanding within the communities that everyone should have a right to water but also be expected to contribute according to their individual potential. At the same time, however, there are problems that particularly affect the marginalized parts of the community, thus further contributing to their unequal position. In particular, these run the risk of going unnoticed and therefore unimproved, which is particularly worrisome from the point of view of justice.

6. Conclusions

This study has brought up a number of inter-related issues concerning willingness to pay for water as well as the economic sustainability and good governance of water schemes. In particular, it has shown that willingness to pay analysis can be highly beneficial with regard to setting prices but also

to the more general decision-making of the WUSC. However, the field research suggests that a merely statistical analysis neglects individual grassroots level factors, which may be crucial for understanding the actual developments in the ground.

According to the survey results, water tariffs are a relatively established practice in Palpa and Nawalparasi, and people in general are willing to pay for a good service. There still were a considerable number of households that were not willing to pay more (in Nawalparasi) or were unable to give an answer (in Palpa). This can be partly explained by the fact that the survey included a number of non-tariff schemes, where the idea of paying for water is likely to still not have quite taken on, making it difficult for the households to estimate any reasonable price they would be willing to pay. However, the field research suggests other reasons as well. Most importantly, there were several households in the case study schemes that experienced regular and long-lasting water cuts. As most of the households interviewed that were in this situation did not believe a higher tariff would help to solve the problem, their unwillingness to pay more or inability to give an answer is a rather rational reaction.

The regression analysis was mostly unable to establish unequivocal correlations between external factors and willingness to pay, or to formulate a model that would be able to predict WTP more. This seems to be because the data simply is too eclectic to yield statistically significant results. However, some weaker linkages could be discerned, yet these differed between the districts. In Nawalparasi, the presence of a private connection correlated with higher willingness to pay more; however, metering as the tariff collection method correlated with lower WTP more. Meanwhile in Palpa, good water quality and a good level of participatory governance both had a positive impact on WTP more.Thus the results from Palpa demonstrate some consistency with regard to WTP more for satisfactory services, whereas no such tendency can be discerned in Nawalparasi. For the pooled data for both districts good water quality again had a positive impact as did belonging to a higher caste.

On the basis of the above results, therefore, it is very difficult to draw more general conclusions about the factors affecting WTP more. What did show up, however, is that there is some correlation between satisfaction with O&M and the implementation of a water tariff, as presented Section 5.1.5. However, the WTP analysis also leaves a lot of open questions, for example regarding the considerable differences in some of the external factors between the districts. Some statistics were surprising, such as the relatively high percentage of households who considered the donor to be the owner of the water scheme and the very low satisfaction with O&M in Nawalparasi. The case studies made it possible to look at possible reasons for these.

The interview data suggests that the WUSCs in both Ramnagar and Jousimajhuwa are relatively well organized and are implementing some good governance practices. Both are, for example, collecting a water tariff and have a rather big O&M fund. Yet both schemes also experience considerable problems with water supply and quality. Partly, this can be understood as a natural consequence of the schemes achieving the end of their expected lifetime, especially in Jousimajhuwa, which was constructed about 20 years ago. However, the consequent question is why the WUSCs have not been able to come up with a plan for sustaining the functionality through repairs.

A lot of the functionality questions revolve around the economic sustainability and financial arrangements of the scheme. Both WUSCs have undeniably also made some unwise and unsustainable decisions, such as building an unsupportable amount of private connections that are now worsening the water shortages in Ramnagar. On the other hand, there also are good

developments, such as the small loans to the community used in Jousimajhuwa to augment the O&M fund. The bigger problem seems to be that even together with a reasonable O&M fund, the water tariff revenue is not sufficient to cover the kinds of repairs needed to keep the scheme functional as it gets older.

This is connected to the problem of ownership, which was evident especially in Ramnagar but to a lesser degree also in Jousimajhuwa. The interview data quite clearly shows that whenever there are bigger problems, the WUSCs turn for external financial assistance. In other words, the WUSCs have taken ownership of the daily functions, but have not been able to adopt responsibility for bigger failures of functionality. The problem is that this responsibility is not carried by anyone else either. It seems that the definition of responsibilities for schemes funded by external donors in the post-implementation phase still need to be better communicated and coordinated.

With regard to equality, the main problem was lack of access, which in both Ramnagar and Jousimajhuwa especially concerned marginalized parts of the community. In both cases, the basic problem was primarily technical, such as congested pipes or closing down of public connections. Yet these result in serious limitations to water access for some households, and thus are something that the WUSCs should urgently deal with. Overall in the case study schemes, however, there was an understanding that everyone should contribute to the water scheme to the best of their abilities, but that everyone should also have access to water. Thus there is a basic consensus about equality and the rights and responsibilities of the community members. This implies a degree of commitment which may be a good sign with regard to the further functioning of the participatory governance of the schemes.

The present study certainly also raises questions far more than it provides answers to them. In particular, it would seem beneficial to do further research on willingness to pay for water. On the one hand, there is a need for information on optimal prices and budget constrictions, which should be carried out at the micro level for each scheme individually in order to yield applicable results. On the other hand, further research is still needed on the factors that affect willingness to pay, perhaps in other districts in Nepal and also with more specific hypotheses.

It is also clear that more information is needed concerning economic sustainability and appropriate financial arrangements to ensure the long-term sustainability of of water schemes. In addition, research on the actual functioning of governance structures between the local and other administrative levels could yield insights into the relations and respective responsibilities that also affect WUSCs. Finally, it would be beneficial to look deeper into the local level to assess potential inequalities and access issues that may exist even within communities that are performing reasonably well in terms of governance.

7. Literature:

Bartlett, R. et al. (2010). *Climate change impacts and adaptation in Nepal* IWMI 139.

Biggs, E. M., Duncan, J. M., Atkinson, P. M., & Dash, J. (2013). Plenty of water, not enough strategy: how inadequate accessibility, poor governance and a volatile government can tip the balance against ensuring water security: the case of Nepal. *Environmental Science & Policy*, *33*, 388-394.

Biggs, E. M., & Watmough, G. R. (2012). A Community-Level Assessment of Factors Affecting Livelihoods In Nawalparasi District, Nepal. *Journal of International Development*, *24*(2), 255-263.

Breidert, C., Hahsler, M., & Reutterer, T. (2006). A review of methods for measuring willingness-to-pay. Innovative Marketing, 2(4), 8-32.

Cameron, T. A., & James, M. D. (1987). Estimating willingness to pay from survey data: an alternative pre-test-market evaluation procedure. Journal of Marketing Research, 389-395.

Champ, P. A. (2003) Collecting Survey Data for Nonmarket Valuation. In Champ, P. A., Boyle, K. J. & Brown T. C. (Eds.) A Primer on Nonmarket Valuation. Springer Science+Business, New York 2003, 59-98.

Damschroder, L. J., Ubel, P. A., Riis, J., & Smith, D. M. (2007). An alternative approach for eliciting willingness-to-pay: A randomized Internet trial. *Judgment and Decision Making*, 2(2), 96-106.

Finnish Ministry for Foreign Affairs (1998) Rural Water Supply and Sanitation Project. Review report. August 1998, Archive of the Finnish Ministry for Foreign Affairs.

Foreit, K. G., & Foreit, J. R. (2004). Willingness to pay surveys for setting prices for reproductive health products and services: a users manual. Population Council.

Government of Nepal (2011) WASH Sector Status Report 2011. Government of Nepal, Ministry of Physical Planning and Works. Available at http://www.codefnepal.org/uploaded/wash-sector-status-report-2011-for-web.pdf (Last visited 16.12.2015)

Government of Nepal/UN Country Team in Nepal (2013a) MDG Acceleration Framework. Improving Access to Sanitation. Report. Available at http://www.undp.org/content/dam/undp/library/MDG/MDG%20Acceleration%20Framework/MAF%20Reports/RBAP/Nepal%20-%20WEB.pdf (Last visited 1.10.2014).

Government of Nepal/UN Country Team in Nepal (2013b) Nepal Millennium Develoment Goals. Progress Report 2013. Available at: http://www.npc.gov.np/new/uploadedFiles/allFiles/mdg-report-2013.pdf

Government of Nepal/UNDP (2014) Nepal Human Development Report 2014: Beyond Geography, Unlocking Human Potential. UNDP. Available at http://www.un.org.np/reports/nepal-human-development-report-2014 (Last visited 28.9.2014)

Haapala, J. et al. (forthcoming) Evolving from designed to self-organised: Institutional analysis of rural water supply scheme management in Far West Nepal. *Water Alternatives*, forthcoming 2015.

Halvorsen, B., & Sœlensminde, K. (1998). Differences between willingness-to-pay estimates from open-ended and discrete-choice contingent valuation methods: the effects of heteroscedasticity. *Land Economics*, 262-282.

Jones, S., Oven, K. J., Manyena, B., & Aryal, K. (2014). Governance struggles and policy processes in disaster risk reduction: A case study from Nepal. *Geoforum*, *57*, 78-90.

Joshi, Sudip (2011) Community Participation & Ownership of Sanitation and Hygiene in Western Nepal. Thesis, Diaconia University of Applied Sciences, Diak-South Järvenpää Unit.

Rautanen, S.-L. (2007) Past Drivers for the Future – Case Nepal. In Juuti et al. (2007) Governance in Water Sector – Comparing Development in Kenya, Nepal, South Africa and Finland. International Centre for Research on Environmental Services and Governance (ICES), 38-60. Available at http://dspace.cc.tut.fi/dpub/bitstream/handle/123456789/20557/juuti_governance_in_water_sector.pdf?sequence=1 (Last visited 27.2.2015)

Rautanen, S.-L.; van Koppen, B. and Wagle, N. (2014) Community-driven multiple use water services: Lessons learned by the Rural Village Water Resources Management Project in Nepal. *Water Alternatives* 7(1): 160-177

Simkhada, N. R. (2013) Problems and prospects of the cooperative sector in Nepal for promoting financial inclusion. *Enterprise Development and Microfinance*, *24*(2), 146-159.

Smith, R. D. (2000). The discrete-choice willingness-to-pay question format in health economics: should we adopt environmental guidelines? *Medical Decision Making*, 20(2), 194-204.

Snellinger, A. (2015). The Production of Possibility through an Impossible Ideal: Consensus as a Political Value in Nepal's Constituent Assembly. *Constellations*, *22*(2), 233-245.

Tiwari, B. N. (2008) Pricing of Water and Sanitation: The Nepalese Experience. Central Department of Economics, Tribhuvan University.

UNDP (2013) Country Sector Assessments: UNDP GoAL WaSH Programme. Volume 2: Nepal. UNDP, New York. Available at http://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ee-library/water-governance/undp-goal-wash-programme-country-sector-assessments-vol-2/UNDP_GoALWaSHVol2_final.pdf (Last visited 28.9.2014).

WaterAid (2008) Nepal – Effective Financing of Local Governments to Provide Water and Sanitation Services. Report, WaterAid.

WaterAid (2013) A Report on Post Implementation Monitoring Survey (PIMS) Nepal. Water Aid, 2013.

Venkatachalam, L. (2004). The contingent valuation method: a review. *Environmental impact assessment review*, 24(1), 89-124.

Wedgewood, A. & Sansom, K. (2003) Willingness to Pay Surveys – A Streamlined Approach: Guidance Notes for Small Town Water Services. WEDC, Loughborough University, UK.

Werner, C., Fall, P. A., Schlick, J., & Mang, H. P. (2003). Reasons for and principles of ecological sanitation. In IWA 2nd International Symposium on Ecological Sanitation, 23-30.

Whittington, D., Briscoe, J., Mu, X., & Barron, W. (1990). Estimating the willingness to pay for water services in developing countries: a case study of the use of contingent valuation surveys in Southern Haiti. Economic Development and Cultural Change, 293-311.

Whittington, D. (1998). Administering contingent valuation surveys in developing countries. World development, 26(1), 21-30.

World Bank (2013) Nepal Rural Water Supply and Sanitation Sector Study. Modalities of Service Delivery, Their Features and Options to Efficiently Increase Access and Sustainability. Draft Overview Report. FCG International Ltd in association with Total Management Services (TMS).

Appendix

Interview questions

At the WUSC level, at least the following questions will be addressed:

- How is the financial administration arranged (e.g. bank account, accounting, who is responsible for what)?
- Are there many cases of non-payment and are there procedures to prevent this?
- Has the WUSC had financial constraints for its functioning? In particular, is the water fee adequate to cover the O & M costs?
- Has the WUSC sought or received financial assistance from the VDC?
- What kinds of investment needs are upcoming and how are they going to be covered?
- What, in the view of the WUSC, are the main issues that need to be improved in the scheme operation?
- How are decisions made e.g. concerning the construction of new taps or the ways in which individual households are connected?
- Are there any complaints about scheme functionality from the households?
- Is the WUSC participating in any kind of a cooperative, or are there plans to establish one?

As for the VDC and DDC, questions will include at least:

- Has the ‘case study’ WUSC required assistance from the VDC?
- What kind of arrangements are in place for the assistance, if any?
- How does the DDC decide which WUSCs it assists and when?

- In the view of the VDC/DDC, is the scheme functioning well and is it sustainable?
- How is the 'case study' WUSC perceived to function (in comparison with others in the district)?
- Is the DDC aware of any cooperatives functioning in the district?

Survey questions

Q. No.	Qs	Response	Skipping
HW1	Do you think a price can be charged for water service?	Yes…… 1 No…… 2	1→HW3
HW2	If no, please say why not?	_____	
HW3	What do you think is the main benefit of having water tap service? *(Do not give options but circle all that are mentioned without prompting)* *(multiple answers)*	Dignity…… A Health…… B Cleanliness…… C Toilet use…… D Hygienic living conditions…… E Vegetable farming…… F Restaurant/other business…… G Livestock…… H Other (specify): _____ X1 _____ X2	
HW4	Do you know who built the water supply of your community?	Government…… 1 Donor…… 2 Government & Donor…… 3 Community itself…… 4 All of the above…… 5 Do not know…… 8	
HW5	Did your household participate in the planning of the water supply at your community?	We were aware of the plan before it was implemented…… 1 We were involved in identifying community members who should be involved…… 2 We attended meetings where the plans were made... 3 We participated in making decisions about the plans…… 4 Other, specify: _____ 6	
HW6	Did your household contribute to the building of the water supply at your community?	Yes…… 1 No…… 2	2→HW8
HW7	What did you contribute? *(Circle all that are mentioned, if more than one)*	Cash…… 1 Labour…… 2 Grain…… 3 Other (specify): _____ 6	
HW8	Is there a tariff for the water supply? *(If the answer is 2 or 3, say that the tariff can also be in the form of work or grain)*	Yes…… 1 No …… 2 Do not know…… 8	

HW9	Do you know what the tariff is supposed to be used for? *(Do not give options but circle all that are mentioned without prompting)*	Operation tools and materials…… 01 Maintenance tools and materials…… 02 Salaries for water management personnel and committee members…… 03 Office rent…… 04 Transportation and food expenses for personnel… 05 Saved for emergency works in the future…… 06 Other, specify: _____ 96	
HW10	In what form is the monthly tariff you pay for the water supply facility?	Cash……..….. 1 Kind ……. 2 Labour …… 3 Other (specify): _____ 6	
HW11	What is the monthly water tariff amount? *Ref: Convert it to monthly cash if it is paid in kind or seasonal*	Cash NPR/month: ___ ___ ___	
HW12	How often is the water tariff supposed to be paid?	When something is broken…… 1 Regularly: monthly…… 2 Regularly: other frequency…… 3	
HW13	Does your household pay the tariff?	Yes…… 1 Sometimes…… 2 No…… 3	1→HW15
HW14	What is the main reason for not paying? *(Do not give options but circle all that are mentioned without prompting)*	No service was provided…… 01 The service level was not worth the tariff…… 02 We use another free water supply…… 03 We are exempted from paying…… 04 We provide labour instead…… 05 We can't afford the tariff…… 06 We don't trust the user committee to use the tariff appropriately…… 07 Other (specify): _____ 96	
HW15	Does your household pay the tariff <u>when it's due</u>? *Ref: Ask whether your household pay the tariff timely.*	Yes…… 1 Sometimes…… 2 No…… 3	1→HW17
HW16	What is the main reason for not paying on time? *(Do not give options but circle all that are mentioned without prompting)*	We don't have cash/grain when payment is due… 1 We don't have time to go and pay…… 2 The responsible person of the household is not present…… 3 The responsible person of the water supply is not present to make the payment to…… 4 Other (specify): _____ 6	
HW17	Do you know how your household is charged for the water?	Standard tariff per household…… 1 Standard tariff per tap split between all households using the tap…… 2 Based on quantity used (metered)…… 3 Combination of standard tariff & quantity used…. 4 Other (specify): _____ 6 Do not know…… 8	

HW18	Do different rates apply to different users?	Yes…… 1 No…… 2 Do not know…… 8	
HW19	Which groups are charged <u>lower</u> rates?	Government…… 01 Business…… 02 Poor…… 03 Dalit/Janjati…… 04 Bazaar area…… 05 Private taps…… 06 Community taps…… 07 Other (specify): _____ 96	
HW20	Would you be willing to pay a higher tariff?	Yes…… 1 No…… 2 Do not know…… 8	
HW21	If you could have a better service by paying a higher price, which would you choose? *(Read the options but only circle the one considered most important)*	Regular and reliable water supply service ….. 01 Better water quality…… 02 Public tap nearer the house…… 03 Household tap…… 04 Higher flow rate…… 05 Taps that don't leak…… 06 Water 24 hrs/day…… 07 Water 12 months/year…… 08	
HW22	What is the maximum amount that you would be willing to pay per month for the improved service that you named? *(Clarify the hypothetical scenario: the improvement chosen in the previous question will be made, but the price will go up. Ask respondent to also think about their earnings and other expenditures, and give the highest price that is actually possible to pay)*	___ ___ ___ NPR /month	
HW23	Which problem makes you unhappy to pay for the service? *(Do not give options but circle all that are mentioned without prompting)*	Water quality deteriorates…… 01 Supply is intermittent – you don't know when water is available…… 02 The flow rate is too low…… 03 Some households are getting better service while paying the same price…… 04 Some households allowed to use the supply despite not contributing to its construction…… 05 Some households allowed to use the supply but shouldn't because of caste/ethnicity…… 06 Tariff money is being misused…… 07 Other (specify): _____ 96	
HW24	Which statement do you agree with the most? *(Read all options and reread if necessary)*	I am the owner of this water supply…… 01 My family is one of the owners of this water supply…… 02 The whole community owns this water supply….. 03 The user committee owns this water supply…….. 04 The government owns this water supply…… 05 The donor owns this water supply…… 06 Other (specify):	

		_____ 96	
HW25	What are the priorities for spending in your household? *(Circle the most important)*	Rent…… 01 Education…… 02 Healthcare…… 03 Food…… 04 Fuel …… 05 Transport…… 06 Clothing, uniform…… 07 Household utensils…… 08 Toilet emptying…… 09 Water supply tariff…… 10 Other (specify): _____ 96	