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Community-Driven Multiple Use Water Services: Lessons Learned by the Rural Village Water Resources Management Project in Nepal

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ABSTRACT: This article examines community-driven multiple use water services (MUS) as pioneered by the Rural Village Water Resources Management Project (RVWRMP) in the Far and Mid-Western development regions of Nepal. These regions are characterised by poverty, remoteness, rugged terrain, food insecurity, water scarcity, and post-conflict legacy. Water provision for domestic and productive uses provides opportunities to address poverty and livelihoods in environments with highly decentralised governance. This study explores the first-hand lessons learned in the RVWRMP in Nepal since 2006. This project is embedded within the local government. Key project entry points are decentralisation, participation and empowerment. This article reflects how the community-managed systems are used for multiple uses whether they were designed for it or not. It focuses on household- and community-level changes and related institution building and participatory planning through Water Use Master Plans and a Step-by-Step approach. Recommendations are made for scaling up multiple use services.

KEYWORDS: Multiple-use water services, local governance, Nepal

INTRODUCTION

Secure water supplies, irrigation, environmental sanitation and also renewable energy are vital for alleviating poverty by opening up livelihoods opportunities and improving food security and health. Communities with agriculture-based livelihoods depend in many ways upon water (van Koppen et al., 2009). Many countries have a long tradition of communities developing their own multiple water sources for multiple benefits. In Nepal, ancient traditional irrigation canals, medicinal springs, sacred ponds, and waterspouts are still in daily use and constitute an integral part of culture, religion, and well-being. The sustainability of some of these ancient structures indicates high initial quality and strong willingness and ability of the users to contribute to their maintenance.

Nevertheless, sustainability of rural water infrastructure, whether constructed by the community or by any external agency, is not to be taken for granted either from a technical, financial or institutional point of view. A recent study on the functionality status of public water supply and sanitation in Nepal found that while the coverage for piped drinking water supply was high at 80%, only about 18% of the systems were functioning well and delivering the expected services fully (Department of Water Supply

and Sewerage, 2011). Similar findings are reported elsewhere (World Bank, 2004; Lockwood and Smits, 2011).

In the development literature various reasons have been identified and solutions have been proposed, but empirical insights in factual implementation of these solutions are still scarce – a void that this paper seeks to fill. One of the common reasons for lack of sustainability is the top-down planned and constructed infrastructure that is cast off on communities without true participation, capacity building, and consequent feeling of ownership from the community's side. This applies to community-managed water supply, micro-hydro power and irrigation systems alike. A water services paradigm is needed that ensures the sustainable provision of water of an agreed quantity, an agreed quality, at a given time, with agreed reliability, and at an agreed site. These services have both hardware and software components. Hardware components concern infrastructure or technology including issues such as technology availability, spare parts, engineering skills, or water resources assessments, while software components represent issues such as support for institution building (leadership, rule setting and enforcement), water allocation and conflict resolution. Another important aspect is the continuity of services: services are not time- and location-specific 'once-off projects' that are finished once the Users Committee is trained and the scheme is physically completed. Rather, services are continuous and provide for post-construction technical and institutional support as well (Lockwood and Smits, 2012).

The importance of decentralisation, participation, and empowerment in the general global thinking on the roles of communities, governments, NGOs, donors, and civil society in sustainable services delivery, is equally valid for water services delivery. This relates to accountability, transparency, user participation, gender and equal opportunities, balancing equity, efficiency and effectiveness in performance, and financial sustainability (Rogers and Hall, 2003). Interactive participation strives to empower the communities to be the leading decision-makers, planners and implementers. As community members are encouraged to use their own knowledge, abilities, and local materials and techniques, the project benefits from local skills and resources. Numerous studies have discussed the merits and challenges of different degrees of participation, and the problems of supply-driven conventional top-down approaches. Interactive participation has been considered the most advanced form of community participation. It can be defined as "a process that encourages joint analysis of information leading to action plans and the creation of new local institutions or the strengthening of existing ones" (Gomez and Nakat, 2002). Learning good practices in procurement, logistics, decision making, and financial management are foundations for the future professional management; this is specifically relevant where the complexity of the infrastructure calls for professional service delivery rather than for a system that builds on volunteerism.

Empowerment is another important foundation for future sustainability when the users are expected to maintain and operate, even further fine-tune, improve and extend their water services. Empowerment can be a goal in its own right in local development, including the development of community-managed rural water services. Aslop et al. (2006) define empowerment as a group's or individual's capacity to make effective choices and then transform these choices into desired actions and outcomes. Empowerment and related capacity-building are also needed for building local resilience for changes. Pahl-Wostl et al. (2008) note how uncertainties such as variability in weather, impacts of climate change, and changing socio-economic conditions provide new challenges that cannot be tackled within the established technology-driven command-and-control management paradigm. This prevailing paradigm is based on a firm belief that risks can be quantified and optimal strategies chosen, that there can be controllable and predictable technical infrastructure based on fixed regulations. Pahl-Wostl et al. (2008) call attention to the notion of 'living with water' where the limits of control and the importance of uncertainties are clearly acknowledged. The authors note how "this cultural framing supports integrated solutions and the implementation of a multi-functional landscape with an increased adaptive capacity of the system" (Pahl-Wostl et al., 2008).

In Nepal, the above is particularly relevant. People in Nepal have always lived with water in a rugged landscape where uncertainty is certain: landslides, floods, weak winter rains, and unpredictable behaviour of the monsoon do not come as a complete surprise. Increased intensity of human activities has accelerated natural processes making them more unpredictable, and such activities as road cutting, overgrazing and deforestation have contributed to even more unstable mountain sides in Nepal. Even normal variability in weather patterns has adverse impacts in the driest corner of Nepal where less or complete lack of winter rains translates immediately into food deficiency and water scarcity.

Decentralised, participatory and empowering water services will also build on communities' realities of managing multiple water sources for multiple uses. Many studies have shown that water services typically enable multiple uses, also when the infrastructure was designed for one single purpose (Smits et al., 2010). Multiple uses and the related multifaceted appreciation of water are inbuilt into the Nepalese culture and tradition. Yet, this is hardly reflected in the delivery of public water services and related sectoral policies. Public services are compartmentalised and fragmented with single mandates (either domestic, or irrigation, or hydropower). Interventions remain parallel, irrespective of communities' own priorities about next steps of improving their access to water for multiple purposes to improve their livelihoods. Sector-specific policies promote a single mandate and guide the related institutions accordingly. For example, Drinking Water Supply Users Committee or Micro Hydro Users Functional Groups throughout Nepal are expected to cater exclusively for the given sector, and are expected to operate within the sector-specific policies, standards and practices. At the same time, there are also policies that allow working across the sectors, providing a potentially useful policy frame of reference for ways in which the users' groups should be organised and operate, even across prescribed sectors. Examples in Nepal include the Local Self-Governance Act 2068 and those related to the multi-purpose cooperatives.

Globally, a new approach has emerged since the early 2000s that seeks to overcome these sectoral divides and enhance sustainability: multiple-use water services (MUS). MUS can be defined as "a participatory, integrated and poverty-reduction focused approach in poor rural and peri-urban areas, which takes people's multiple water needs as a starting point for providing integrated services" (van Koppen et al., 2009). The operative word here is water service as MUS represents "a new and alternative way of thinking about water services provision for sector agencies, in the sense that MUS fundamentally changes the objectives of water services provision, and the expected impacts they can generate" (Smits et al., 2010).

While there is global consensus that the application of the general principles of decentralisation, participation, empowerment and MUS is likely to lead to more sustainable water services delivery in Nepal and elsewhere, there are still very few real-life efforts to apply these principles. The RVWRMP in Nepal is one of the few projects that pioneered participatory approaches to MUS at scale, being embedded in local government. It provides any combination of the following services: drinking water supply, water for sanitation and hygiene, both conventional and unconventional irrigation, micro-hydropower (community-managed hydropower), improved water mills, and water for livestock. This project started moving beyond the conventional sectoral barriers of the domestic and productive sectors. While the MUS approach is increasingly accepted, there is even less evidence on whether and how it can be made to work on the ground in Nepal or elsewhere. The present paper also fills that gap.

OBJECTIVES AND METHODOLOGY

The purpose of this study is to analyse the experiences of the RVWRMP in implementing a MUS approach in order to identify strengths and weaknesses of the services to sustainably meet people's multiple water needs, including the needs of marginalised groups.

The RVWRMP is fully embedded into local government structures, so it is expected that if the MUS approach works in these remote regions, it should be possible to apply the approach through local

government structures in other parts of the country as well. Hence, the present study will inform policy debates on community management, service delivery models, sustainability and, generally, how to address poverty through water sector development, both in rural Nepal and, indeed, elsewhere.

The analysis and structure of this paper follow the conceptual framework presented in van Koppen et al. (2009). It focuses at the household, community and intermediate levels, drawing conclusions and recommendations for intermediate, national and international levels. The specific questions, and the structure of this paper, are organised accordingly:

At the household level the study addresses two aspects: the change in service levels before and after the schemes were completed, and the productive uses of water schemes originally designed for domestic uses only.

At the community level of the Village Development Committee (VDC), the questions are:

- *Inclusive community institutions.* What are the institutional arrangements at the community level for planning and implementing schemes? What kind of tools guide remote isolated and less-experienced communities through potentially complex sets of choices and actions to be taken?
- *Sustainable water sources.* How are water sources identified? Appropriate technology: What are the actual technology choices? How do these serve people's multiple needs?
- *Financial arrangements.* What are the costs of different options? What kind of financial contributions and arrangements are in place?

At the intermediate (District Development Committee) level, the questions relate to participatory planning, strategic planning and coordinated long-term support.

The conclusions synthesise the strengths and weaknesses identified and formulate recommendations for RVWRMP, national and international policy-makers.

The methodology used is both quantitative and qualitative, drawing on materials and data from RVWRMP covering the period of September 2006 to June 2013. Quantitative data were derived from the Water Use Master Plans (WUMPs) prepared in 2007/2008 that served as baseline data at the time. These were compared to the data collected in 2010/2011 when the WUMPs were updated for the project's Phase II. These covered all VDCs in the hills. The qualitative analysis utilised the primary data collected through field visits and interactions with the communities, the local governments and other district-level stakeholders, and the project staff members to enrich and triangulate all information. Before answering the questions, background information is provided on the country context of Nepal and RVWRMP.

STUDY BACKGROUND

Country context of Nepal

Nepal is predominantly a rural society with 83% of the population living in the rural areas (Central Bureau of Statistics, 2012). This mountainous country of diversity has 26.5 million people and more than 100 caste/ethnic groups with some 60 distinct languages or dialects. Extreme slopes, high snow-blocked passes, seasonally flooding rivers and landslides, as well as tropical lowlands with tropical dangers, such as malaria, have historically led to strongly localised cultural and religious patterns. Against this background local governance is nothing new: local decision-making and taking action accordingly have been a matter of local survival.

The regional disparities within the country remain evident. Nepal's decade-long civil war came to an end in 2006 but the overall political instability continues. It has had a severe impact on Far and Mid-Western development regions. These remain the least developed regions in Nepal measured by

practically any development indicator and when compared to the rest of Nepal: gender and social discrimination indices, life expectancy, literacy rate and GDP per capita stand out (UNDP, 2009). The Far and Mid-Western regions are also consistently food-deficit. The soil quality is poor and access to fertilisers low, the rain-fed agricultural techniques relying on age-old manual methods and oxen. The RVWRMP mid-line study in 2011 found that in most of the working VDCs household production is typically only sufficient to meet demand for 3-5 months of the year. This is critical for farming communities that rely on their own production. Consequently, there is a high seasonal migration over the border to India for low-paid unskilled labour.

Far and Mid-Western regions are seasonally water-scarce and generally dry compared to the rest of Nepal. The average annual rainfall of the country is about 1530 millimetres (mm) with sharp spatial and temporal variations in rainfall. Rainfall distribution varies in both north-south and east-west directions. The monsoonal rain which accounts for 80% of the total rainfall, declines westwards: whilst eastern Nepal receives approximately 2500 mm of rain annually, the Far-Western Nepal receives 1000 mm (Government of Nepal, 2008). Unpredictable and missing winter rains in RVWRMP working VDCs means that most of the 6 m³ rooftop rainwater harvesting tanks constructed remain empty for a large part of the year; this has not encouraged others to request for these systems. Yet, rainwater harvesting is of high importance in terms of capturing large amounts of rain for recharging seasonally drying water sources, and for irrigation and livestock.

Rural village water resources management project

RVWRMP is a development cooperation project supported by the Governments of Nepal and Finland. RVWRMP is fully embedded into the lowest tiers of the local government structures. In June 2013, RVWRMP had 73 active VDCs in Achham, Baitadi, Bajhang, Bajura, Dadeldhura, Dailekh, Darchula, Doti, Kailali, and Humla districts selected according to the poverty indicators and water-related coverage of infrastructure service. RVWRMP aims to improve the quality of life of the local people and environmental conditions, and to increase opportunities to rural livelihoods through rational, equitable, and sustainable practices of water resources planning and use. To achieve this, the project enhances local capacity to manage local water resources sustainably, and provides technical, financial and management support to increase access to sanitation, drinking water supply, community-managed irrigation, and small (micro) hydropower and improved water mills, and any combinations of these that the project defines as multiple use systems (in the project, but not in this paper, also abbreviated as 'MUS') in the sense of infrastructure designed for multiple purposes. The overall approach is holistic, participatory, inclusive, and bottom-up.

RVWRMP Phase I (2006-2010) piloted water services that were specifically designed to serve multiple uses, rural micro-finance, and sustainable livelihoods through home gardens and value chain development to address poverty and food scarcity. In Phase II (2010-2015), these are being scaled up across all working areas with an increasing awareness of the diversity of available technological options and their livelihoods applications. Micro-financing through formal multi-purpose agricultural cooperatives as well as through informal saving and credit groups is closely linked to overall livelihood development. MUS can serve these needs by making water available and hence opening up opportunities that did not exist previously.

FINDINGS AND DISCUSSION

Household-level findings

This chapter reflects the changes in access to water comparing the baseline made in 2007/2008 with the mid-line study made in 2010/2011 when updating the existing WUMPs in 47 hill VDCs. While most of the data directly supported the communities in an update of their WUMPs, it also served the project

as the mid-line study, being baseline for Phase II. The data for the mid-line study were collected by the same people who facilitated the WUMP update process in each VDC. Data collection formats were prepared for VDC-level, cluster/ward-level, schools, households, health posts, and community organisations. The enumerators/facilitators were trained and supervised by the project staff. The sample size for the household survey was 10% of the total number of households in each VDC, with a minimum sample of ten households in each ward, and a total minimum of 90 households. The sample had to cover a representative proportion of households from each ethnic/caste group living in each VDC. See RVWRMP (2011) WUMP Review and Baseline Guidelines for the complete process and all formats. The originals were in Nepali.

Most of the WUMP priorities identified in 2008/2009 related to drinking water supply, and consequently, 59% of the schemes completed in Phase I were gravity-flow piped drinking water supply schemes. Yet, as has been observed thereafter, most of these are used as multiple-use system. As is evident in tables below, there were in total 5352 more households identified in 2010/2011 compared to the original WUMP baselines. This can be explained by how the people defined or rather, identified, their household and who belonged to it, given the large number of households with extended families, and by the fact that the first batch WUMPs did indeed miss out clusters of houses.

The Service Level score is a composite indicator of five parameters: quantity (litres per capita per day), continuity of service (hours/day), reliability of the service (months/year), water fetching time (collection time, including travel to the water point, waiting, collecting and carrying the water back), and water quality (as assessed visually, i.e. water quality was ranked as 'good' if no possibility of contamination was observed). In the mid-line study 27% of the households had reached the best Service Level 1, up from 6%. Overall, by the mid-line study more than half (59%) of the households were within the Service Levels 1 and 2, up from one-third (35%) only a few years earlier.

Table 1. Changes in service level 2007/2008 compared to 2010/11 in 47 VDCs.

Year	Unit	Service level				Total Households
		1	2	3	4	
2007/2008	No. households	2178	10,598	10,377	13,934	37,087
	% of total	5.9	28.6	28.0	37.6	100
2010/2011	No. households	11,359	13,481	8896	8703	42,439
	% of total	26.8	31.8	21.0	20.5	100

Source: RVWRMP WUMPs 2007/2008 and RVWRMP WUMP review data 2010/2011.

Water fetching time is one of the parameters and directly related to MUS: it is assumed that the longer the water fetching time, the fewer the MUS applications. Table 2 shows how water fetching times have decreased. In 2010/2011, almost half of the households are within the 'best' time bracket compared to one-fifth in the baseline. In terms of quantity of water available the change is more subtle, yet, apply to 8042 households: in 2007/2008 out of 37,087 households 69% had more than 45 litres per capita per day available. In 2010/2011 out of 42,439 households 79% faced the same situation (Table 3).

The rising service levels have opened up new opportunities by making water available near the households. For instance, according to the May 2013 monitoring data collected for the project from each working VDC, the home gardens, which are new in this area, have now been taken up by 11,581 households which did not have home gardens previously (RVWRMP monitoring data, May 2013). The project promotes the use of tap stand drainage for irrigation of home gardens, among others. In a focus group discussion with 32 representatives from 12 drinking water supply schemes in May 2013, all

stated that it used to take them more than half an hour to fetch water and that at that time none of them had a home garden. Now with the new gravity flow piped water near their houses, all had home gardens and six respondents had increased the number of their livestock.

Table 2. Changes in water-fetching time in 47 VDCs.

Water fetching	2007/2008		2010/2011	
	Nb. households	%	Nb. households	%
< 15	7615	20.5	20,197	47.6
>15-30	13,452	36.3	11,847	27.9
>30-45	8808	23.7	6181	14.6
>45	7212	19.4	4214	9.9
Total	37,087	100.0	42,439	100.0

Source: RVWRMP WUMPs 2007/2008 and RVWRMP WUMP review data 2010/2011.

Table 3. Changes in water quantity in 47 VDCs.

Water quantity	2007/2008		2010/2011	
	Nb. households	%	Nb. households	%
< 45	25,547	69	33,589	79
25<45	5625	15	5140	12
15<25	2516	7	2064	5
< 15	3399	9	1646	4
Total	37,087	100	42,439	100

Source: RVWRMP WUMPs 2007/2008 and RVWRMP WUMP review data 2010/2011.

In May 2013, members of the RVWRMP field staff were requested to categorise the overall water use in the completed gravity flow water schemes that they were directly working with. In this sample, out of the total 314 schemes serving 174,938 people, 68% were used for vegetables in addition to domestic uses. Only 26 schemes were designed for multiple uses, yet multiple uses for livelihoods improvement were clearly evident in other schemes. Just over a quarter (28%) of the schemes was reportedly used for drinking water only, typically where the design flow is very low and the intermittent system can only provide a limited volume of water per household (RVWRMP staff survey, May 2013).

Community (Village Development Committee)-level findings

Community institutions

The institutional arrangements at the community level are in the most critical condition for community-level MUS to work. In RVWRMP, these have been aligned with the institutional structures described in the Local Self Governance Act 2068, both when planning and when implementing individual schemes. Thus, the project chose to strengthen the weak local governance system by encouraging the citizens to operate within it, and avoid the establishment of parallel project-specific structures that tend to bypass local governance.

In RVWRMP, there are two distinct types of community institutions: one VDC-wide Water Resources Management Committee that has a representation of each of the nine wards that constitute a VDC; and another, a Water Users Committee, representing the users of each individual scheme that enters into planning and consequent implementation of the scheme. Both of these are in line with the local institutions as defined in the Local Self Governance Act 2068: the first in having an advisory role at the

VDC level, and the other in terms of having registered users groups for a specific local development purpose.

At the VDC-level, the first type, the Water Resources Management Committees were established as soon as a VDC was selected for preparation of the Water Use Master Plan (WUMP). This committee was supported by the WUMP facilitators who in Phase I were external consultants (from Kathmandu) hired by the project and in Phase II persons hired locally by VDCs and the District Development Committee (DDC). The Water Resources Management Committee has representatives from each of the nine wards and, in Phase I, from subbasin committees also established by the project. In Phase II, the subbasin committees were merged into ward-wise committees as the subbasin structure was found to be confusing. Residents in their clusters of houses and wards were used to organising themselves in human units, not divided by boundaries drawn by external people. Water Resources Management Committees have recently been re-named as VDC Water, Sanitation, and Hygiene Coordination Committees (V-WASH-CCs) as defined in the newly launched Nepal National Sanitation and Hygiene Master Plan to align these institutions fully with the recent policy changes as far as WASH is concerned. Yet, the original water resources thinking remains on the agenda: V-WASH-CCs continue to plan for more than WASH; their Terms of Reference are more than what is outlined in the National Sanitation and Hygiene Master Plan.

At the individual scheme level, the second type, the Water Users Committees (WUCs), were established for each scheme that had been selected from the WUMP for implementation. WUCs are registered under the Water Resources Act and by doing this, they establish a right to their water source and become legal entities as formal users groups. The premise is that by bringing the scheme budgets and related decisions down to the lowest appropriate levels the principles of good governance, including financial transparency and accountability, can best be realised. In many VDCs, the RVWRMP schemes were the first opportunity for the community to take the driver's seat and plan, procure, implement and manage their scheme and related budget. By contrast, many other projects and programmes still have shared bank accounts between the WUC and its supporting non-governmental organisations (NGOs).

Two key process tools used by the respective institutions are the VDC-wide WUMPs and the individual scheme-specific Step-By-Step approach. Both are supported by the Gender Equity and Social Inclusion Strategy and structured monitoring.

WUMPs became the entry point to any action within a VDC. In Phase I, WUMPs were prepared in 47 hill VDCs in collaboration with Helvetas Nepal and by the technical support of Kathmandu-based consultants. In RVWRMP, WUMPs consist of pre-planning, planning and post-planning phases which include a total of 17 steps. In the pre-planning phase, the VDC is identified and the committees are established. In the planning phase, each ward-wide committee and eventually the main VDC-wide committee identify the existing structures, water sources, needs, and priorities with a five-year vision and annual works. In the post-planning phase, the WUMP is introduced and included in planning procedures at the district level, in an attempt to trigger interest by others working in the district to take up and finance schemes from the priority list.

One lesson was that the multiple-use and multiple-source approach does not come automatically. The first WUMPs suffered from the single-mandate approach and short-cutting in what was meant to be inclusive participatory processes: many facilitating consultants assumed that drinking water supply was the priority and acted accordingly. The participatory ward-by-ward meetings were not very thorough. The first batch of WUMP consultants did not question whether any additional nearby sources existed in the large mountainous VDCs but rather, accepted without doubt what certain community members decided to tell them. This met not only their interests but also communities' short-term interests in wage labour as designing large systems would result in more wage labour in construction. However, during the WUMP reviews in 2011, the project facilitated a WUMP review in all 47 VDCs as

part of the Phase II baseline verification. The project staff facilitating the WUMP review data collection and community planning meetings identified all water sources, including those previously "hidden" and "missed MUS opportunities". These additional sources have opened up more MUS potential in these communities, where the water source can provide more water for multiple uses rather than designing the system to deliver only for purposes of drinking water. Thus, RVWRMP brought productive water uses for livelihoods, and also sanitation, higher on the agenda than in the earlier versions of WUMPs.

Another lesson learned from the WUMP process was that its preparation needs to be institutionalised into the VDCs' existing planning process to ensure a sense of ownership and consequent use and update of the plan. The basic WUMP itself relies on local knowledge and shared understanding on the present status of the VDC, ward-by-ward: where are the gaps in various water resources and environment-related services; who is left out; and what are the priorities? The new WUMPs cost less owing to the use of local human resources instead of high-tech applications such as GIS mapping. The modular thinking remains: if more financial and other resources are available, GIS-based maps or draft technical drawings can be prepared.

Lastly, an important lesson learned is that the WUMP process addresses the shortfalls in many so-called demand-driven development approaches whereby only the well-voiced communities used to get development activities. Transparent and inclusive planning over several years through WUMP appeared effective in avoiding ad hoc lobbying for individual schemes by the more powerful and in ensuring the inclusion, voice, and priorities of each of the nine wards that constitute a VDC in Nepal. However, risks remain. Even in RVWRMP, some wards of a VDC have several layers of infrastructure efforts in various degrees of functionality, whilst some other wards in the same VDC never had anything at all.

The Step-By-Step approach to scheme implementation and sustainable services guides each project selected from the WUMP. It identifies tasks to be completed and training to be done before proceeding from one step to another. Each step involves structured monitoring on the basis of which the budget is released in instalments to be remitted to the WUC's account. The leading principle of the Step-by-Step approach is that specific activities including both capacity-building and physical works need to be satisfactorily completed and monitored before moving to the next step and having additional funds released. The Step-By-Step approach remains a constant work in progress, aiming at both fully functional physical structures as well as active WUCs to ensure sustainable water services. The systematic capacity-building, step-by-step through learning-by-doing and specific training events, all aim to build WUCs that will be able to operate and maintain their schemes.

One lesson of the Step-By-Step approach is that since the members will be changing, capacity-building and learning-by-doing do not constitute a one-off activity. The WUC itself needs to adopt a continuous learning culture within itself, both for orienting and training new members and for improving the practices and services as the demand amongst the users changes. The post-construction support is meant to assist WUCs in this but eventually it all depends on the internal dynamics in the individual WUC members: there are cases where all members have been changed. WUCs should periodically re-elect their members but in practice, the resigned, deceased, or otherwise missing members continue to be missing until something, usually major damage such as a landslide that needs immediate attention, triggers the committee back into action. Yet, intermediate-level post-construction support for the capacity-building of new WUC members, remains a challenge. In case of RVWRMP, the post-construction phase support remains. However, at the district level these services are not available and the operation and maintenance (O&M) issue even within one sector remains a hot topic in Nepal, contributing to the poor functionality of the water supply systems across the country.

It was also realised how participation entails risks of corruption, self-interests and downright criminal activities. The more complex and costly the infrastructure, the more the procurement and decisions involving financial transactions involved. There were a small number of cases where the core WUC members themselves abused the funds regardless of the public audits and calls for transparency.

Out of 265 WUCs and over 900 individual schemes by the end of May 2013 one case has resulted in formal criminal charges with police search warrant for the Users Committee Chairperson still effective for more than two years.

Overall, the empowerment and continued capacity-building have mitigated these risks. For instance, the Step-By-Step approach includes public audits prepared by the WUCs to show the community its income and expenditure, and to answer any questions relating to procurement. At the community level it is easy to verify items such as the number of bags of cement or other materials procured, and to question issues such as costs related to transportation. Public audits and hearings are appreciated at the community level to the extent that the people started asking the other projects and programmes in their villages to do the same.

Last, in both the institutions described above, the gender equality and social inclusion principles that guide the Finnish development cooperation are also addressed: there must be a balanced representation in the committee by women and by disadvantaged groups. Further, separate planning meetings need to be organised with women-only or disadvantaged caste groups-only if their voices cannot be heard otherwise. Out of the total 2712 members in 265 Users Committees, 44% are women. However, only 6% of the Chairpersons are women although this is slightly balanced out by 61% of the Vice-Chairpersons being women. Around 17% of the Secretaries and 60% of the Treasurers are women (RVWRMP scheme database, May 15, 2013). Qualitatively, there is still room for improvement in leadership. Literacy amongst the women is very low, and many semiliterate female Treasurers have been identified, indicating that a woman was only selected because the project has insisted on having women on the key posts and that in practice someone else was taking care of the bank account.

Water resources

Water resources are identified as part of the WUMP preparation process. These locations are identified with GPS and their flows are measured just before the monsoon, i.e. at the driest possible moment. In the Far and Mid-Western context, these are usually springs or streams, or combinations of these, i.e. springs which also receive subsurface flows from the streams, making these sources vulnerable to contamination. River sources are typically utilised for conventional hill irrigation and micro-hydropower applications only. There are very few lakes in the two regions and none in the working VDCs. Yields in all water sources vary between the different seasons and so do their uses. Where possible, multiple sources are identified and tapped into the one gravity flow water supply system. The WUMP reviews in 2011 highlighted the importance of maintaining the traditional small water sources as an emergency back-up, should the main system fail for any reason.

WUMPs have helped to identify available water resources in a holistic way in a micro-basin. Because a VDC as an administrative unit does not necessarily follow micro-basin boundaries, water sources are also identified from the adjoining VDCs. In some cases, relevant clusters from adjoining VDCs have been included into the actual WUMP for action, especially if the water source is outside the VDC and where the sanitation behaviour of the adjoining VDC is felt to be a risk to water quality.

Upstream-downstream issues are usually localised within a water system: for instance, in a large gravity flow system the users of the upper taps may compromise with the availability of water for those at the end of the branches. This has become evident especially where irrigation for homestead gardening has become more popular but where water saving practices including drip irrigation practices have not been fully applied and where the WUC has been unable to respond to higher uses by regulating water rotations in different branches to accommodate such higher uses. Water shortage within the system can be found where the use of drainage water from the public tap stands for home gardens below the tap stand have become popular: people keep the taps running as long as there is water (or somebody else comes to close it) to flood-irrigate their gardens below the tap stand.

Table 4 shows the changes with regard to the main water sources as identified for clusters of houses. It shows improvements in terms of moving towards theoretically safer and more reliable water sources. Due to poor sanitation and the fact that many sources, even spring sources, receive subsurface and surface flows, bacteriological safety is not to be taken for granted. In Table 4, 'tap' refers to the public tap stands in a gravity flow piped water network. The source is usually, but not always, a protected spring. Generally, this source is considered the safest from the point of view of drinking water quality. 'Spring' refers to unprotected springs which usually receive subsurface flow water. 'Canal' is a traditional open irrigation canal which may or may not be lined with cement. It receives water from the rivers and bigger streams and, hence, with the possibility to have more abundant quantity available but with questionable quality. These receive both river water and any surface flow from the hill sides.

Table 4. Main water sources used in 47 VDCs.

Water source	2007/2008		2010/2011	
	No. of households	% of total	No. of households	% of total
Tap	9957	26.8	25,481	60.0
Spring	15,844	42.7	10,620	25.0#
Water spout (traditional spring)	6245	16.8	2811	6.6
Spring-fed stream	312	0.8	153	0.4
Stream	3728	10.1	2288	5.4
Canal	532	1.4	411	1.0
River	142	0.4	82	0.2
Rainwater	-	0.0	168	0.4
Other	327	0.9	425	1.0
Total households	37,087	100.0	42,439	100.0

Source: RVWRMP WUMPs 2007/2008 and RVWRMP WUMP review data 2010/2011.

Appropriate technology

Individual schemes in RVWRMP were and continue to be identified through WUMPs. Smart combinations of water sources and integration of existing infrastructure into new designs, among others, is highly recommended but hampered by prevailing reluctance to rehabilitate anything. New construction remains as the preference. This is a national-level policy dilemma as there are no clear policies for rehabilitation or for using old structures. Even tapping into more reservoir capacity by rehabilitating available and repairable reservoir tanks in the system is rare; ignoring them is the usual practice. Yet, it has been noted that micro-hydro schemes get very quickly repaired by the community's own effort should, for instance, a landslide wash out any canal works. Somehow, the lack of electricity impacts the communities harder than a lack of drinking water supply. It has been observed in many cases that the gravity flow drinking water supply systems do not get the same attention and immediate action. This may be a gender issue: it is women who carry the water, and it is women who lack a voice in most of the communities.

In the course of the years, RVWRMP has acknowledged that practically all schemes are used for multiple uses but that there are also distinct differences on how this is done and what future steps can be.

Firstly, there are schemes that are multiple-use systems 'by design' and identified as such in the WUMP. The beneficiary population and service coverage are clearly defined, capacity-building and other kinds of support are tailored to fit the MUS system and thinking, and there is one WUC to plan and manage the scheme.

Secondly, there are schemes where the initial approach was sectoral following the single use priorities identified in the WUMP, but the end-result clearly served multiple uses. These services may be offered by one WUC through one system; or by several WUCs through separate systems. Since these schemes were planned through participatory processes through the WUMP and then implemented through the Step-By-Step approach, they can be defined as inclusive. The capture of the process by elites is less likely. The schemes in this category have all potential of being full-fledged MUS. With some improvements, such as by adding more reservoir capacity or distinct irrigation taps into the system, these could be developed to fully serve multiple purposes. In these schemes there is a need to shift the mindsets of WUCs to service-delivery-thinking and overall awareness of the multiple benefits that their system can offer. WUCs need to unlearn what they learnt from single-use sectors and acknowledge the multiple services they can deliver. MUS thinking is new to WUCs from technical and management points of view even if de-facto multiple-use of water is a daily practice.

Thirdly, we have also identified schemes that are MUS for some beneficiaries only. In these cases the system is used for individual multiple use (livelihood) applications by the individual users but not across all the users of the given system. The uncontrolled private use and related private water connections to small greenhouses and other homestead irrigation purposes may exceed the capacity of the water source and thus, compromise the access to basic drinking water by the other users, usually the ones downstream. This case is the most conflict-prone: water is used for multiple purposes in an unplanned manner that compromises basic drinking water needs of others. WUCs in these types of schemes need to address the water uses when preparing the O&M plans including water tariff, and overall system-level rule setting.

Fourthly, as already mentioned, there are also systems that remain as single-use systems. In these cases the water sources are just enough to cater to an intermittent distribution system and basic domestic use; no effort is made to tap into more water sources or to add, for example, rainwater reservoir tanks into the system. The latter could generate multiple benefits but this is not recognised and no action has been taken to develop the system and services further. There is a WUC for each individual system but no attempt to join the forces for tapping into any potential outside an immediate single system.

Individual schemes in the two last categories would need further attention and technical support in shifting them towards full MUS. The entry point for all is that the water users will try to use the water for multiple uses anyway, and that this could be done in an inclusive and planned way, ensuring also water use efficiency and future sustainability. In all four cases, one needs to be aware of the political and other local power relations: there will always be individuals who are not in favour of sharing their present benefits. Such hierarchies can be anticipated and addressed in transparent planning and rule setting. WUMPs can be used as a tool also for addressing this.

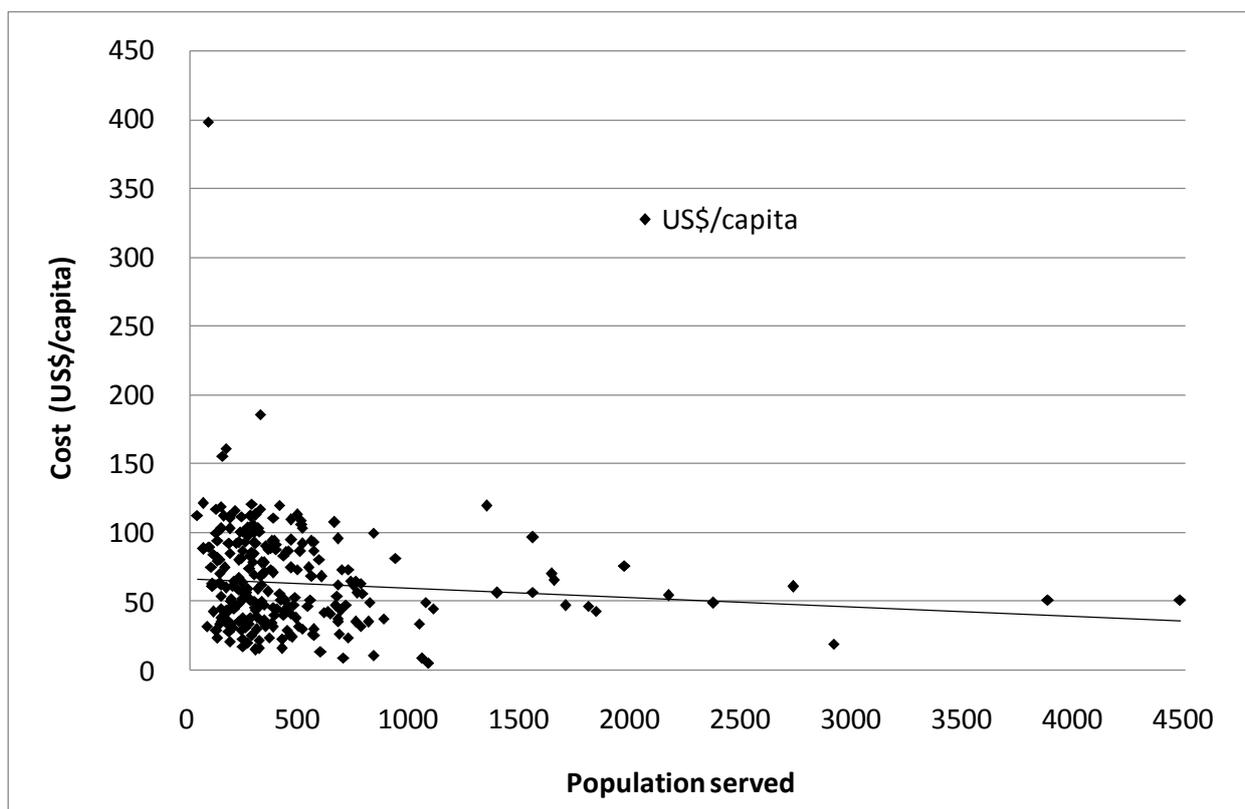
Sustainable financing sources

The financing sources in RVWRMP include the donor (Finnish bilateral grant), Government of Nepal (through Ministry of Federal Affairs and Local Development/Department of Local Infrastructure and Agricultural Roads), the two lowest tiers of local governments (DDCs and VDCs), and the users (beneficiaries) themselves. There are also other donors for the micro-hydro schemes including the regular government subsidies. The contributions from the two governments are deposited to District Water Resources Development Funds in each district under the local District Development Funds. The Government of Finland contribution flows directly into these local-level funds. Since these are established to serve local development, they are not narrowly earmarked. District Management Committees, led by the Local Development Officer, prepare the annual plans and make the operational decisions with regard to releasing funds into the WUCs accounts. These District Management Committees also release the payments for the Support Organisations (local NGOs) or to the Support Persons (individuals hired by the DDC to support project activities).

Cash and in-kind contributions are expected from the users and the VDCs according to the type of technology selected. For instance, for a piped drinking water supply scheme (usually gravity flow water system) the VDC is expected to contribute NPR100 (about US\$1.1) per tap and the users NPR500 (about US\$5.6) with another NPR500 allocated for the future O&M fund. In addition, the users are expected to contribute one working day per household for non-local material transportation from the road head, one working day per household for the collection and transportation of local materials, and unskilled labour for the trench digging and pipe burying for the total length of the system. For drip and sprinkler irrigation, the community contributions are calculated per beneficiary household, and for conventional irrigation schemes per plot size in the command area. For micro-hydropower schemes VDCs were expected to contribute NPR100 (about US\$1.1) per capita while the households were expected to contribute NPR500 per kW (about US\$5.6).

The per capita costs of 280 completed and financially cleared schemes in 2008-2012 are very divergent as shown in Figure 1. Costs not only diverge, but economies of scale are also weak; the cost per capita does not significantly decrease with the size of a scheme. This sample includes 35 schemes that have been designed for irrigation and micro-hydro, all with essentially multiple-use characteristics. These do not stand out from this sample other than for one individual small MUS-by-Design (US\$398/capita) that includes drinking water supply, irrigation and a very small hydropower (peltric) set. As described earlier, all gravity flow water supply systems are used for multiple-uses in practice.

Figure 1. Investment costs per capita for 280 water schemes.



Source: RVWRMP MIS Data, 07/2012.

Each scheme is unique, also from the point of view of per capita cost. This per capita cost includes the contributions by all stakeholders, also those in cash and kind by the communities. The two highest per

capita costs are for combinations of gravity flow drinking water, micro-hydro and conventional irrigation. The one that stands out as highest per capita cost is the very first MUS-by-design scheme that serves only 84 households, featuring all services within one system. The cost is explained by the long transmission line and the electro-mechanical investments made for a small number of households. This pilot case has clearly too high costs per capita to be replicable but has served as a technical inspiration to various stakeholders. The four cases with highest costs per capita are for multiple uses in the sense of including hydropower and related conventional hill irrigation but after that, the other schemes with combined services, including hydropower in most cases, do not stand out from the rest of the schemes. Amongst the ten lowest per capita cases, five are conventional irrigation schemes, all with a fairly large number of beneficiaries, ranging between 297 and 1080 per scheme. As discussed earlier, practically all gravity flow drinking water systems serve both domestic and productive uses. Most have sanitation-related costs included. All micro-hydro schemes are also for irrigation.

RVWRMP does not have per capita cost ceilings given its remote working area where the transportation costs alone influence the costs. Again, these costs diverge depending on the accessibility of the VDC and the location of the scheme within: some of the VDCs are geographically large and topographically demanding. This has led some stakeholders, even within the staff, to think that RVWRMP can do anything at any cost. Since 2013 there is an ongoing debate about whether to establish a per capita cost ceiling or other criteria for cost-efficiency. Essentially, this is about agreeing that 'water for all' may not be possible unless individual scattered households and very small clusters of houses agree that the only option for them is to improve traditional sources. The sustainability of large systems for a small number of beneficiaries is questionable as maintenance of long transmission lines in landslide-prone areas is a challenge even to larger groups of houses that are in a position to pay for a full-time maintenance worker.

In remote locations without formal banks, RVWRMP realised the importance of including micro-finance strategies both in terms of informal saving and credit groups and in terms of formal multi-purpose agricultural cooperatives, opening up opportunities that were not in the villages before. In the cooperative VDCs, the WUCs have deposited their O&M funds into the cooperative accounts, hence keeping the funds safe and gaining interest. This practice gives an opportunity to formally mobilise these funds locally instead of keeping them idle or mobilising formally within the WUC.

Geographic or poverty targeting is an option to offer subsidy only in certain areas or to certain groups of people. In the case of RVRWMP, the project itself is geographically targeted to the most disadvantaged regions of Nepal. At the community level, even the 'moderately poor' are, after all, poor, and disadvantaged. RVWRMP also collaborates with programmes that provide food-for-work, especially in very large schemes where the expectations for community's contribution are equally large, such as constructing several kilometres of water canals or digging pipelines.

Intermediate (District Development Committee) – level findings

Participatory planning at district level

While local political settings are always critical, this is especially the case in Nepal during the years of civil conflict and later, during the post-conflict transition. Local politics and power relations could even be ignored less: civil society organisations including WUCs and many beneficiary groups do have their political affiliations. Elected leadership is missing at all levels resulting in lack of long-term visionary commitment and accountability. In this challenging context, it appeared even more important to have robust methodological tools across the working VDCs, such as WUMP and the Step-by-Step approach, to enable bottom-up integrated planning according to people's priority needs.

Strategic planning at intermediate level

WUMPs are visioning tools and serve the VDC level fairly well in establishing strategic directions over a five-year period and in identifying annual works. Yet, long-term visions and related commitments are hard to find at the district level. Climate change and the legacy of the decade-long internal armed conflict in Nepal add more layers of unpredictability into this already complex system. The VDC-level WUMPs feed into the existing strategic local government planning system. In contrast, many civil society organisations and even government line agencies tend to bypass the VDC-level planning cycle: their annual work plans are not done through Village Council planning meetings. Further, some civil society organisations bypass even the district-level planning processes. The situation is complicated by the long-term absence of elected local bodies and high staff turnover of the government bureaucracy that has been operating the local governance since 2003.

Coordinated long-term support at intermediate level

Coordinated long-term support to communities is currently lacking within the government institutions. This together with the historical lack of interest in post-construction services in practically any sector is a real challenge: all stakeholders want to report new beneficiaries and new works; rehabilitation is not popular.

RVWRMP aims at institutionalised capacity at district level to continue integrated water resources planning and to support communities in implementing and maintaining WASH and livelihood activities. RVWRMP has a substantial capacity-building programme for various district-level stakeholders, including district-level government officials, local civil society, and local students in terms of internships. Representatives from all political parties are regularly invited to join the monitoring visits and special events in the VDCs to increase awareness of the range of development work being done; hence, introducing MUS and other non-conventional solutions to politicians. The RVWRMP has signed a Memorandum of Understanding with departments out of which especially the Department of Agriculture and the Cottage and Small Industries Development Board are active partners, allocating also their own financial and human resources for joint activities. All micro-hydro schemes are funded and implemented together with the Alternative Energy Promotion Centre, the central-level governmental coordinating body, and its programmes.

Whilst at the present time the shape of the future local and district governments is not known, RVWRMP has made an attempt to build capacity and awareness on a number of issues, MUS and sanitation included, across a range of stakeholders from government officials to civil society to political representatives at both VDC and district levels. It is hoped that whatever shape and boundary the possible federal states will have, there is the critical mass of people with capacity and open minds for ideas such as MUS services.

CONCLUSIONS AND RECOMMENDATIONS

This paper presents the experiences of RVWRMP in applying decentralised, participatory and empowerment approaches in water services for multiple uses. These are all important conditions for inclusive sustainable water services. Even though the project is still young and long-term evidence on sustainability is not available to further prove this relationship, experiences presented and lessons learnt on the various conditions at community and intermediate level that need to be in place for such approaches to work are indications for improved sustainability.

At household level, the paper compares the situation in the working VDCs when the WUMPs were done for the first time in 2007/2008 to the situation when the WUMPs were reviewed and updated in 2010/2011. This shows that there has been a substantive increase in service levels. The number of households in Service Level 1 has increased from 2178 to 11,359. This means that access, availability, quality and reliability of water services have all improved for these households. The shift towards better

service levels implies, for instance, that the time used for fetching water has decreased significantly: whilst in 2007/2008 only 7615 households had water available within a 15 minutes return trip, in 2010/2011 there were 20,197 households in this category. These households have started home gardens that were not practised earlier due to lack of water.

At community level, RVWRMP provides intensive support for participatory planning and implementation, and institution-building to that end, embedded in local government. These two tools that aim at building resilient WUCs with a sense of ownership are: VDC-wide WUMPs and Step-By-Step approach to individual scheme planning and implementation. These approaches consider communities as the core group of stakeholders, and therefore their values, perceptions, needs and traditional knowledge and related ways of 'living with water' are as much as possible taken as a point for entry into delivery of sustainable water services. This is expected to build a sense of ownership for the constructed infrastructure and appreciation of the services delivered.

The identification of water resources is central to WUMPs. While some infrastructure was designed for multiple uses from the outset, gravity flow water schemes designed for domestic supplies massively turned in reality into multiple-use systems. Both project management and communities appeared to have to unlearn single-use mindsets. Therefore, promoting multiple water uses and multiple water sources is all about acknowledging that this will happen anyhow, whether or not the systems are designed for it. At the same time the various stakeholders must remain vigilant that basic needs for drinking water supply do not get compromised.

At intermediate (local government) level VDC WUMPs' procedures were fully embedded in local government planning processes. This planning, prioritisation and institution-building appeared to be robust even in the highly politicised context with no elected councillors in place. The project's capacity-building for critical mass is expected to have a long-term effect whatever the new local government structure will be. The modular approach to WUMPs makes the basic process affordable and as such, any VDC can now prepare WUMPs without external financing. Lastly, longer-term transparent planning avoids ad-hoc elite capture to at least some extent.

These lessons learned from RVWRMP's decentralised, participatory and empowering MUS approach embedded in local government have national and international implications. The WUMPs and Step-by-Step procedures are replicable and can be scaled throughout Nepal and indeed elsewhere. This will challenge policies and standards that prescribe one-fit-for-all solutions within restricted earmarks of funding and strict sectoral mandates. Integrated participatory approaches in water services according to people's priorities imply, above all, that they build on the ways in which rural communities manage the complexities of multiple water sources for multiple water uses as a way of life; they learn and adapt. Continuing to operate within single-sector mandates, the full contribution that water can have for rural livelihoods and well-being will continue to be missing. RVWRMP considers all uses, users, sites of use and water resources and infrastructure holistically.

Therefore, for scaling, national policies need to be equally responsive, adaptive, and dynamic by decentralising decision-making about fund allocation to communities and local government. This integrated perspective also opens up smart combinations of water sources and integration of existing infrastructure into new designs, among others. In practical terms this means, for example, that standard designs used at intermediate level should allow for local applications, such as additional reservoir tanks and irrigation structures in what is traditionally considered as gravity flow piped drinking water systems. Since MUS is about locality-specific applications, national scaling up of MUS calls for simultaneous action across sectors, emphasising the above call for working through decentralised systems and local government structures. It cannot be centrally planned; even large-scale MUS must be grounded in its own locality. As long as funds are not too strictly earmarked and broad technical capacity is available, no national coordination is necessary.

As a first step in scaling this approach, it is recommended to start with developing a vision and a related strategy at all levels. Since planned intentional MUS is something different to many stakeholders who are used to, and do, operate within their single-sector mandates, a shared vision should be established to trigger interest and understanding. At community and local government level, WUMP is a useful tool for outlining this vision. At the intermediate level, the vision could be specific for each region and district, somehow unique for the administrative unit and watershed within which the action is to be taken. Its strategic elements should be do-able actions building on existing practices, such as utilising the local development funds as local basket funds for non-earmarked pooling of financial resources. At the national level the vision should be about creating an enabling environment: to encourage work across sectors, disciplines, and financial streams without losing the lines of accountability. Further, action-research is recommended on how to realise these changes and on medium- and long-term impact assessments for sustainability of water services for health and livelihoods.

In sum, RVWRMP's experience shows in practice that there is human drive to use a system as a multiple-use system and that this can be promoted at scale. A clear vision of what MUS has to offer in a country context, bringing together water, sanitation, food security, energy, and environmental issues for everybody could appeal to politicians and policy-makers seeking to improve the well-being of their voters.

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