FLORES REVISITED:

Sustainability, hygiene and use of community-managed water supply and sanitation and the relationships with project approaches and rules

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Abbreviations and Acronyms

AusAID	Australian Agency for International Development, the Australian Government's aid agency
BAPPENAS	National Development Planning Agency
BPSAB	Badan Pengelola Sarana Air Bersih dan Sanitasi (the community WSS facility management organisation)
Desa	Village
Dusun	Hamlet or Sub-village
FLOWS	Flores Water Supply and Sanitation Reconstruction and Development Project (FWSSRDP, later known under the acronym FLOWS), an AusAID-assisted project
GOI	Government of Indonesia
GTZ	Gesellschaft für Technische Zusammenarbeit
IRC	International Water and Sanitation Centre, based in Delft, Netherlands
JICA	Japan International Cooperation Agency
Kabupaten	District, the administrative subdivision of a Province
Kecamatan	Sub-District, the administrative subdivision of a District
KfW	Kreditanstalt für Wiederaufbau
LSM	*Lembaga Swadaya Masyrakat*: equivalent of an NGO
Masyarakat	Community
MPA	Methodology for Participatory Assessments
NTT	Nusa Tenggara Timur, province to which Flores belongs
OECF	Overseas Economic Cooperation Fund (Japan)
Padat Karya	Food for Work Program
PHAST	Participatory Hygiene Awareness and Sanitation Transformation
PRA	Participatory Rural Appraisal (aka Participatory Rapid Appraisal)
VIP	Village Infrastructure Project
WASPOLA	Water Supply and Sanitation Policy and Action Planning Project, a partnership between the GOI, AusAID and the World Bank, executed by WSP-EAP
WSP	Water and Sanitation Program (of the World Bank)
WSP-EAP	Water and Sanitation Program for East Asia and the Pacific (a regional part of WSP)
WSES	Water Supply and Environmental Sanitation
WSSLIC	Water Supply and Sanitation for Low Income Communities, a World Bank –funded project

Executive Summary

Between April and July 2002, women and men community members and independent outsiders evaluated 63 community managed rural improved drinking water supplies, sanitation and hygiene in Flores, NTT, Indonesia.

The primary aim was to gain insight into what had happened three to eight years after project completion, with an average of almost five years. A second aim was to contribute to sector policy reforms. A third aim was to produce insights, and even specific handles, on new rural water supply and sanitation projects/ programmes.

The evaluation teams used the Methodology for Participatory Assessment (MPA). This new, Indonesia-pioneered methodology combines the use of participatory methods with statistical quantitative analysis to assess sustainability and effective use of improved water supplies and sanitation. Gender and social equity are integrated in both contents and process.

The evaluation took place in a stratified random sample of 63 improved village water supplies, out of an estimated total of 260. Under difficult conditions, great care was taken to achieve maximal representativeness for differing ecological, socio-economic, technical, institutional and spatial conditions.

Sampling within villages, for users and non-users at various points in the systems, and separate meetings with local managers, better off and poor women and men, served to bring out the perspectives of the different user groups.

The original projects have been supported by AusAID (FLOWS) in 52 villages, the World Bank (WSSLIC) in six villages and international and national NGOs (Care, Dian Desa, Delsos and Tana Noa) in five villages.

The water supplies include point sources (dug wells and rainwater reservoirs) and piped gravity systems tapping springs or streams. Piped systems have public taps or a mix of public and private taps. Complexity ranges from single village systems (two third) to single villages with several water supplies, and multiple villages sharing one or more piped water supplies. FLOWS and WSSLIC supported only one type of sanitation.

The projects have generally reached villages with poor households. Participatory welfare classifications in 55 villages brought up only three villages (5%) with no poor households according to local standards. In 24 villages (44%) half or more of the households are poor.

At the time of visit, 57 of 63 villages (90%) had a completed improved water supply or supplies, of which 52 were visited. Of these, 51 or 98% were functional. The latter is quite an achievement as an earlier project supervision report was very sombre about sustainability prospects.

In eight villages, or 13%, the water supplies have not been completed, although the villagers had shared in planning and given labour and cash contributions. In two of them, construction never even started. Reasons are natural disasters, technical problems, but especially absence of attention to and mediation on social issues (water sharing, traditional laws and customs). Seven projects were FLOWS', one WSSLIC's.

In all projects, the villagers contributed labour. In 73% of FLOWS projects, they also contributed cash although this was not compulsory, as in WSSLIC projects. People also paid cash in four of the five NGO projects. The common system was for all to contribute the same fixed amounts, in spite of substantial differences in capacities and benefits, e.g. in distance to public taps or access to a private tap. In a few cases, households could

contribute whatever they liked. Only two FLOWS villages and one NGO village had weighed contributions.

Participatory decision-making in planning, whereby village women and men make informed choices in return for their demonstrated demand, has been present but limited. The distribution of decisions in which village men and women (and not just the local elite) have participated is as follows: project initiation - 7%; technology choice -5%; choice of service levels – 10%; location of facilities – 26%; composition of local water management organisation – 43%; local operation and maintenance arrangements – 19%; local financing arrangements – 48%.

Women and the poor have benefited from improved facilities and new opportunities to participate in planning and management decisions and training, but not to the same extent as men and local elites.

Throughout Flores, the gender balance in local water management organizations has remained low. In villages where such organisations have remained active, the gender balance is better. However, in only six villages do both sexes currently attend management meetings *and* make decisions jointly.

Women and men, including poor women and men, felt that work was divided equitably in about half the cases; in the others, especially women and the poor tend to do the voluntary work. Equity in division of work occurred significantly more in the eastern districts. In those cases, the poor also tend to have a better share of the water.

Although the number of villages with active, more equitable water management is small, there is already a significant difference in performance, e.g. in more timely and higher level repairs, better cost recovery and a somewhat better performance of water supplies, although none function adequately.

Improved sanitation and hygiene education have generally been part of the projects. In the FLOWS project, local leaders allocated free ‘demonstration’ latrines to a few households. Users could not opt for different models, e.g. dry latrines in villages with a lack of water. There was no accountability for allocation and little demonstration to others: mostly people could not say what had happened to the distributed latrine packages.

The achieved sanitation coverage in the sample is reasonably high (54%), but mostly because people have installed latrines with their own resources. There are also large differences in sanitation coverage between villages for reasons that require more detailed analysis of the data.

Use of latrines is universal, but not exclusive. Three quarters of the adults and children still occasionally use the open space.

Hygiene knowledge is good, with the exception of two aspects which happen to be most crucial: safe disposal of the stools of babies and infants, and a low priority to washing hands in general and at critical times in specific.

There are no baseline data that can show to what extent the current knowledge can be attributed wholly or partly to project inputs. There were no statistically significant differences for women and men, poor or non-poor.

The access to the improved supplies within the villages, 85% in the total sample three to eight years after construction, may be called good. Only five villages have less than 50% general access, while in 40% of the villages all households leave within easy reach of an improved system. To which extent the result is attributable to additional projects requires further analysis of the data.

The above achievement meets one condition for an impact on public health, were it not that there is no guarantee that everywhere this water is safe to drink. Problems here are: no water quality tests, no chlorination, poor protection of intakes coupled with contaminating practices in some of the catchment areas, and poor drainage at the public taps in virtually all systems while water pressures are not always consistently high.

From a social perspective, 40% access for all is not so acceptable. While there was no evidence of systematic exclusion of the poor from water, the adequacy of supply was generally less good for this group.

More important for health even than sufficiently safe drinking water is enough water for personal and domestic hygiene. Here, some serious problems exist. In between 10% and 50% of the villages in the districts, the amount of water in the improved systems only meets the needs for drinking and cooking and sometimes some (but not all) hygiene needs.

In only one third of the systems is the water enough to meet all needs for hygiene and small scale domestic production (vegetable gardens, brick making and the like) of the households. Forbidding bathing and clothes washing at waterpoints has not prevented stagnant water and is counter-productive to hygiene.

Regularity and predictability of water delivery are not good in many villages. A twenty four hours supply by gravity is available to two thirds of the villages in the rainy and half in the dry season. Major reasons are overestimation of source capacities and more villages and households with private connections (among which many illegal ones) than the systems can bear without upgrading.

In the rainy season, the water is frequently turbid. This is mostly due to inadequate designs and lack of catchment area management, but to some extent also lack of maintenance (e.g. no regular cleaning of reservoirs).

Spring-based systems generally do better than river-based systems, except that water quality was not better in the former, due to the above-mentioned shortcomings. Flaws in designs and/or quality of materials and workmanship have been common, and are serious in some 10% of the cases. The transmission pipeline, reservoirs and the distribution network are the weakest components.

There was a significant correlation between the views of the engineers and male and female users, especially for the bad cases. The in-depth study showed that women users identified more flaws than men. In the few (four) cases where local women and men have had some control over quality of design and construction, the quality of the works was significantly better.

Only one village has not made arrangements to recover the running costs of the water supplies. Various administrative arrangements are used, mostly direct user charges. In none of the villages, income covers all running cost.

The situation is best in five villages, which cover all operation and maintenance costs plus some of the larger repair costs. Over half have serious financial shortages. Major emerging factors are: operation and maintenance costs are not budgeted for; budgets are not realistic; tariffs are not equitable; people are not actually asked to pay; and if asked, not everyone pays.

Wherever individual villages have arranged for better accounting and transparency, financial performance is already significantly better, although no-where optimal scores have been achieved for all indicators.

At the start of operations, all villages but one had a water and sanitation management committee. Tree to eight years later, 31% have active committees. In the others they have become dormant (53%) or defunct (6%).

Besides special committees, local women and men identified on average some 30 organisations or individuals outside their village and 29 within who play a role in water supply, sanitation and hygiene. Women were almost equally knowledgeable as men. A more detailed analysis on closeness and trust has not yet been made. As mentioned, the gender balance was and is low, but is better in active committees. This difference is statistically significant.

Correlation analysis for the main variables showed that proper local management and influence from women and men on a range of local planning decisions are closest associated with higher overall sustainability scores. The first set explains 44% of the variation found, the second 27%.
In their turn, both sets are significantly correlated with more equity in dividing contributions and benefits.

Scores for the policies and organizational characteristics of the supporting agencies did not show up significant differences. This is probably because most village projects had the same support agencies (Indonesian government service), although some bias from the procedures of the agency meetings cannot be excluded.

The above mentioned relationships indicate linkages, not causality. Independent advice from an Indonesian statistical expert was sought to determine whether the quality of the quantitative data allowed for a more refined analysis, such as regression and factor analysis. Regression makes it possible to predict that if X is improved, Y will follow. Factor analysis helps establish which factors in a whole set are most essential for the found results. However, the data base was statistically not robust enough to allow for such more advanced analysis.

Although some villages have done significantly better than others on democratic planning, service management, and gender and social equity, none of the villages have scored optimally on all indicators of the three sets. This shows that on these aspects considerable progress is possible in new projects.

The study also shows that in new projects it will pay off to pay particular attention to the differences in institutional and social and cultural conditions in individual villages, to the social and environmental feasibilities of system sharing and to local control mechanisms (by village men *and* women) of quality of design and construction. Villages and technology projects with more complex situations clearly need more time and high quality support, including for social organisation and mediation.

These findings points to the need to replace a single, linearly planned approach for participatory project planning and implementation by more diversified time tables and support packages which are tailored to the different types of situations on the ground. One-sided imposing of short-sighted and ineffective project rules, such as bans on washing and flat fees for all, can be prevented by introducing more democratic and well-informed participatory decision making in which the different interest groups are represented equitably.

In the ‘completed’ villages, considerable further progress is possible. This might focus on a better composition of, and division of work in, village water supply management and on capacity building for more adequate and equitable local systems management. The latter should include cover accountability of the committees to the – male *and female* – heads of households for the management of the systems. It also involves creating generally known

routes for addressing specific weaknesses and gaps. Simply electing new committees is seldom the best or only answer.

A further priority subject is awareness raising on and skills building for sound catchment area management.

In a small group of villages with poor quality design and construction, technical improvements are needed. It could be considered to offer these villages the option to address the faults with a combination of local and outside resources. The latter could lay especially in training, advice and some specific design work.

Participation of local women and men, who have direct experience with the systems, in the planning, and in monitoring the proper executing of corrections, will be of great value. This will also give an opportunity to arrive at more adequate, equitable arrangements for the organisation of the local management and co-financing. The same strategy might be followed in villages with no or not completed supplies provided there is still enough trust fore a retake.

A general lesson is that, wherever project support is given, it should include designing for, and capacity building on feasible forms of expansion of the water supplies. Decisions on expansion must be part of good management and village women and men must also all know what local scopes exist for private connections and what the implications (positive and negative) and alternatives are. Only so can continuing population growth in the villages be planned for.

A better and more equitable strategy for sanitation is possible. It may imply community-based planning and monitoring of a range of sanitation options, with support from within the villages for their poorest households. The welfare classification tool will be of help here and in setting differential water tariffs. A gender perspective is also required.

Promotion of hygiene and monitoring of change can be built around a few agreed key areas, such as safe excreta disposal of excreta of babies and infants and during stays in the fields, and safe handwashing habits (i.e. with soap or soap alternatives and safe rinsing, at critical times).

The study has revealed that the new sector policy can be strengthened further on community management aspects, training and gender and social equity. The main text of this report suggests in which specific policy guidelines lessons from this evaluation can be applied.

In the use of the MPA, the priority has gone to collecting a substantial amount of high quality information. Possibilities for further in-depth analysis of the database are indicated in the main text. This focus on data collection reduced the focus on the other side of the methodology: the empowerment of village women and men to locally tackle their problems through participatory knowing, analysing and acting upon information. This misbalance was inherent to the use of the methodology in an evaluation. However, further insights have emerged on how the coherence of the two methodological objectives can be improved.

The participatory evaluation of improved rural water supplies and sanitation in Flores, NTT, which has been the second largest MPA study in Indonesia, has been an exciting, stimulating and overall rewarding experience for all involved. It has resulted in a rich data base and useful insights. It is hoped and trusted that they will contribute to enhance the access and use for all of improved water supply and sanitation in Flores, NTT and Indonesia.

Preface

Between April and July 2002, women and men community members, members of local water and sanitation management organizations and staff from the supporting agencies carried out a participatory evaluation in 63 villages in Flores, NTT, Indonesia. Using the Methodology for Participatory Assessment (MPA) in 55 villages, they assessed community water supply and sanitation conditions, services and project approaches. For another eight communities, information was collected through key informants. The 63 communities had been assisted between three and eight years earlier to improve their water supply and sanitation conditions and services through projects financed by AusAID, WSSLIC or NGOs.

The MPA enables community members, project support staff and external facilitators/ evaluators to quantify findings from participatory rural appraisal (PRA) work on comparable scales. This makes it possible to compare the findings across and within projects, communities and community groups, and statistically analyse the mainly quantitative information. Further qualitative information is documented to provide insights into the underlying reasons of the scores. Also recorded are men and women's perceptions of the outcomes and their ideas on possible actions.

Besides quantifying participatory, PRA-type data, the MPA mainstreams gender and poverty perspectives in contents and processes. It does so in three ways. First, local information is, wherever relevant, disaggregated by sex and socio-economic groups (better off and worse off), as defined and identified by the community members themselves. Second, situations with a better gender and/or social equity receive a higher relative score on the scales than situations that are not gender and welfare sensitive or actually discriminate certain groups. Third, women and men identify and analyse their local situations in four separate groups: women and men with a higher or lower welfare level. The disaggregated and weighted approach makes it possible to test statistically whether project and community approaches with higher equity scores do significantly better in sustaining and using the improved water supplies and sanitation facilities than projects and communities with lower equity scores.

The methodology had been developed for a global study and has since been validated in a dissertation and applied in a series of programs in Indonesia[1]. For the Flores study, the MPA has been adjusted to local conditions and expanded to incorporate more sanitation, hygiene, community organization and technical aspects. In addition, more work was done on external factors that may contribute to significant differences in results between communities, regions and projects. Quality control was strengthened as well.

In their evaluations, the local groups were assisted by external teams of technical and social staff from local NGOs and a local university. The teams assisted the community groups in making their inventories, analyses and scoring using the correct procedures for validity. They also recorded much qualitative information on the explanations that the different community groups gave for the outcomes and noted their reactions to these outcomes. An Indonesian NGO with much experience in using the MPA in earlier studies, and with previous MPA training experience, provided the training and day-to-day quality control. In addition, the work benefited from independent quality control from two external MPA specialists.

[1]Gross, Bruce, Wijk, Christine van, & Mukherjee, Nilanjana (2001). Linking sustainability with demand, gender and poverty: A study in community-managed water supply projects in 15 countries. Washington, D.C.: World Bank Water and Sanitation Program; Wijk-Sijbesma, Christine van (2001). The best of two worlds? Methodology for Participatory Assessment of Community Water Services. (PhD Thesis, Wageningen University). Delft: IRC International Water and Sanitation Centre. For details on use in Indonesia, see www.wsp.org and www.waspola.org

This report gives an overview and analysis of the study findings. It also reports on the testing and validation of the refinements and adjustments to the methodology. It may be used to learn about the strengths, weaknesses and effectiveness of earlier approaches to improving water supply, sanitation and hygiene in Flores, NTT. It is also a case study which provides new insights for the emerging new water sector policy. These insights will also be of value when developing new projects and programs, for which this report gives some first strategy indications. It further suggests where more in-depth studies of the database may be done.

The intended users are, in the first instance, the policy makers deliberating the new Indonesian policy for community-managed WSS (the WASPOLA Working Group) and their counterpart decision-makers in AusAID, who financed the FLOWS project and may consider further support to the sector. Other possible users are the supporters of the WASPOLA process, the authorities in Flores and the project development team of a new project in NTT which is financed by GTZ and KfW.

The contents of the report have been built up as follows. Chapter 1 gives the background to the study – the water and sanitation projects in Flores, NTT. Chapters 2 and 3 describe the objectives, design, preparations and implementation of the study. Chapters 4 and 5 present the main findings. In Chapter 4, an overview is given of the current conditions and practices concerning the water supply, sanitation and hygiene in the project areas some three to five years after the projects have been completed. Chapter 5 contains a description and analysis of the factors which were found to relate significantly to the differences in the degrees to which the concerned villages currently sustain and use the services. This chapter also addresses the gender and social equity aspects of the improved water supplies and their local maintenance, management, financing and use, and sanitation and hygiene. The conclusions from the analysis and what they may mean for any new projects and current policy development are presented in Chapter 6.

Many people have contributed to the work. Within the team, Ruth Walujan developed the extended transit walk tool with which engineering aspects of the water supply systems were evaluated and quantified. Nina Shatifan played an important role in refining the training and quality control programmes, and in implementing and reporting on this part of the work. Kumala Sari coordinated the work of the leading NGO, managed the data entry and did the first data analysis together with Christine van Wijk. Ishani Mukherjee did the first cataloguing and analysing of the qualitative data, focusing on the top and bottom performing communities. She and Kumala Sari also did the analysis of the Bahasa fieldreports for the details on specific cases. Richard Hopkins' close knowledge of NTT was invaluable in the design of the sampling strategy. He was also the overall task manager and the great stimulator of this evaluation.

Many others also contributed to the report. In Pradipta Paramitha, Clarita Kusharyo ,Deviariandy Setiawan, Herry Wijanarko, Lisda Kartika, Gregorius Kelik, Ferona Ralumatya, Dieni Savitrai, Gloria Aurelia, Helmi, Ronald Senjaja, Novianti Widya, Zakri Martino and Hanny entered the data and helped consolidate the data base. Jeffry Simamora advised on the possibilities for a further statistical analysis. In the World Bank Water and Sanitation Program, Arie Istandar helped develop the sanitation checklist. Alfred Lambertus, also in the WSP, and Marielle Snel and Jo Smet in IRC peer reviewed it. Zabeta Moutafis from AusAID gave feedback on the first results and gave direction to the report by indicating the specific issues of interest to her organization. Elia Hartati of AusAID and Tri Dewi Virgiyanti, Salusra Widya and Oswar Mungkasa of the National Development Planning Agency (Bappenas) also gave feedback on the findings during a meeting on 'work in progress' which helped shape the current report. Their valuable assistance has been much appreciated. The authors would like to stress, however that the presented findings, conclusions and recommendations remain their sole responsibility.

Delft/Jakarta, 1 December, 2002

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1. Water Supply and Sanitation Interventions in Flores

1.1. The development of water supply and sanitation in Flores

The island of Flores is one of the group of eastern islands in Indonesia making up the province of Nusa Tenggara Timur (NTT). The province is located between Nusa Tenggara Barat (NTB) and Maluku. The capital is Kupang, in the west of Timor island (Fig 1). NTT is one of the least developed provinces in Indonesia. Administratively, Flores comprises six districts (with the recent subdivision of Kabupaten Flores Timor into two) and more than 700 villages. In common with most of the islands of the region, Flores is volcanic, with seasonal rainfall (monsoons from November to March) and is generally drier and flatter towards the east.

The development of water supply and environmental sanitation facilities, in towns and villages, has had a long, slow history in Flores. Ten years ago, access to these facilities was patchy, but generally at very low levels. In December 1992, Flores suffered a significant earthquake and tidal wave, resulting in several thousand casualties and major damage to infrastructure. A large relief program was mounted, and several elements of that program were continued as longer-term development projects. One such program was the AusAID-supported Flores Water Supply and Sanitation Reconstruction and Development Project (FWSSRDP, later known as FLOWS).

1.2. The AusAID-assisted "FLOWS" project

The US$20 million Flores Water Supply and Sanitation Reconstruction and Development Project (FWSSRDP, later called FLOWS) was formulated in direct response to the December 1992 earthquake and tidal wave. The aim of the project was to to assist the GOI with reconstruction and development of water supply and sanitation facilities in urban and rural areas of the (then) five Kabupaten (Flores Timur, Sikka, Ende, Ngada and Manggarai) of Flores Island. It was intended that the initial emergency assistance would be followed by longer-term assistance with the reconstruction and development of WSS infrastructure. Thus the project was to evolve from disaster relief to being a normal development project under the bilateral assistance program. The project formally commenced on 2 July 1994, and officially closed on 30 June 1999.

The project goal was to promote social and economic development in Flores, NTT, by increasing the provision, access, effective use and sustainability of water supply and sanitation facilities in urban and rural communities. The objectives of each of the two main implementation components of the project were as follows:

- Urban WSS Development: to strengthen and support relevant government departments and local water authorities in the planning, implementation and management of water supply and sanitation systems in selected Kabupaten capitals, Kecamatan towns and permanent resettlement areas; and
- Rural WSS Development: to strengthen and support community groups and local agencies in the planning, implementation and management of water supply and sanitation facilities in selected settlements.

The strategy for implementation generally followed the evolution phases described above. The distinction between urban and rural settlements was based on the GOI administrative definitions at the time. The works of interest to this study were those under the "rural" component only.

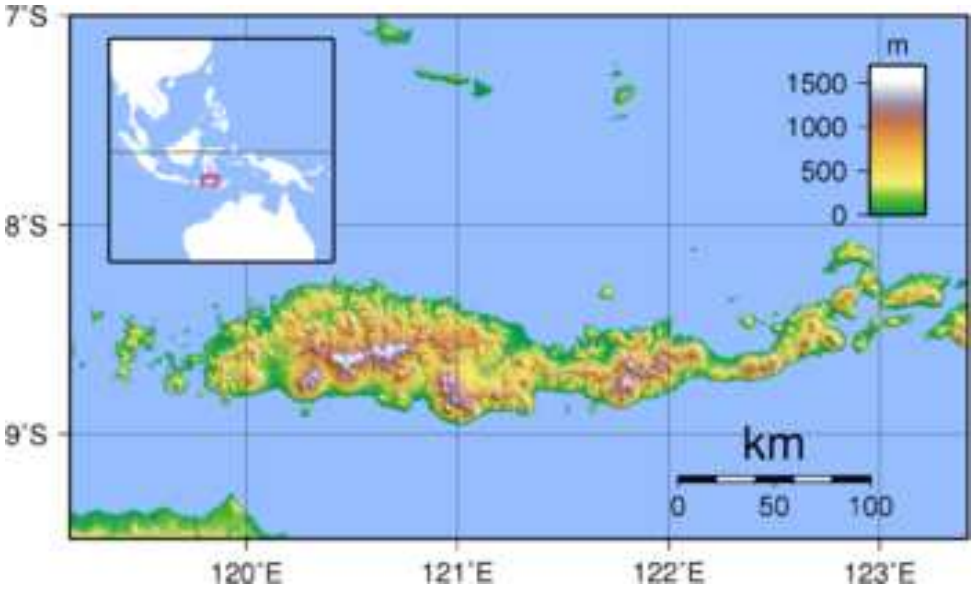


Figure 1 Map of Flores (Nusa Tenggara Timur)

Being the most recent of the three similar AusAID-assisted WSS projects in the eastern islands, the design for this project was considerably influenced by the experience and lessons learned from the earlier projects. Key aspects described in the FWSSRD project design strategy included:

- targeting of economically disadvantaged people living in urban and peri-urban slum areas and low income communities, and in un-served and under-served villages listed by the GOI under its poverty alleviation programme;
- community participation, and engagement in decision-making processes;
- integrated environmental health education reinforcing the sanitation program;
- narrowing gender gap disparities by involving women in all aspects of project development;
- demand-driven interventions;
- cost recovery through community capital cost contribution and user fees;
- training using structured learning approaches;
- human resource and institutional strengthening; and
- involvement and development of LSMs (local NGOs).

The Australian contribution to project costs covered technical assistance and training, and the procurement of goods and equipment. The balance of materials and equipment, and the costs of construction work (mostly under the urban component) were met by the GOI, with communities also making significant contributions to the rural component works. There were no construction contractors engaged in the rural program; all construction of facilities serving the village communities was undertaken by the villagers themselves, without receiving any payment from the project.

1.3. Other projects for water supply and sanitation

There were other long-term initiatives in water supply and environmental sanitation improvement active in Flores over the last decade. They included the World Bank-supported Water Supply and Sanitation for Low Income Communities (WSSLIC) project, some Japanese-funded (JICA and OECF) small dams and Village Infrastructure Project works, and several local NGO programs. Then in the late 1990s, there were a number of short-term government-sponsored welfare/relief activities, including Padat Karya and Social Safety Net programs, which featured water supply and environmental sanitation works.

The WSSLIC project design was based on very similar concepts to those described above for the FLOWS project. Communities were to be assisted by project facilitators contracted annually from local LSM and consulting organizations. There were two important differences in the WSSLIC project: (i) obligatory minimum community contributions, totaling 20% of the total project costs (4% in cash and 16% in kind); and (ii) construction in most cases was by contractors engaged by the project. The management structure of WSSLIC was relatively complex, involving multiple project managers from three joint implementing agencies. But, by design, the main features of the approach were consistent with those of FLOWS.

Other programs, including the Japanese-funded VIP project and the social safety net schemes, involved payments to community members for their contributions; indeed, for many of these programs this was their primary purpose. During the drought and other crises of 1997-98, a number of relief programs operated alongside and in conjunction with the on-going long-term development projects.

Meanwhile, AusAID became the major sponsor of another sector initiative with the World Bank WSP-EAP, the Indonesia Water Supply and Sanitation Policy Formulation and Action Planning Project (WASPOLA), which facilitates policy reform by a multi-agency government Working Group chaired by BAPPENAS. Part of the WASPOLA project is a series of case studies, aimed at converting field experience into lessons learned, to feed into the policy discussions.

WSP-EAP and government staff, members of the WASPOLA team, were involved in a mini-evaluation mission in the final month of the AusAID project, in June 1999. It was suggested at that time that it would be of interest for WASPOLA to conduct a longitudinal assessment of a small number of sites in Flores, coming back several times over several years to look at the sustainability of WSES services and facilities. The WASPOLA work plan included provision for a small assessment exercise in Flores in mid-2001.

In April/ May 2001, AusAID mounted a pre-feasibility/ identification mission which identified interest in a possible WSES project in Flores. Although the details remained to be determined, it was suggested that a possible project could focus on rehabilitation and operation and maintenance aspects of WSES facilities and services, although there was certainly scope for some additional new facilities construction as well. An important requirement for the definition of such a project is a better appreciation of the current condition of WSES facilities and services in Flores. It was therefore agreed to combine these two assessments, in effect, replacing the small longitudinal study with a much larger scale assessment of WSES in Flores.

2. The MPA Study

2.1. Goals and objectives

The overall goal of the assessment has been to gain an understanding of the current water supply and environmental sanitation conditions in village communities on the island of Flores and the perspectives of end-users. In relation to this, the study was to (1) complement the existing database of sector experience, with particular focus on the sustainability of facilities and services, to support the policy reform process and (2) provide similar data to assist AusAID's consideration of a possible new AusAID-financed WSES project in Flores. A subsidiary goal was to inform others of the processes involved, specifically the representatives from AusAID and other ESAs with interests in and responsibilities for sector programs and projects, and members of the WASPOLA Working Group.

More specific objectives were to carry out:

- a situation analysis to get an overview of the water supply, sanitation and hygiene conditions in the project areas after the completion of the projects
- a sustainability analysis to assess the degrees to which the WSES improvements in the villages are technically, environmentally, socially, financially and institutionally sustained and effectively used;
- an analysis of project approaches to determine to what extent the overall design and rules of the agency programs were actually applied in village projects and whether and how agency approaches and their field implementation have affected sustainability and effective use;
- an analysis of gender and social equity perspectives of the project implementation including how their implementation links with sustainability and effective use of village water supply and improved sanitation;
- an analysis of how, according to poor and better off women and men, the interventions have impacted the households (both positively and negatively) and the community

The specific tasks of the assessment were to:

- define the most appropriate methodologies for conducting such assessments, based on existing participatory methods, and train Indonesian NGOs in all phases of the conduct of the assessments;
- complete field-based participatory assessments in a representative sample of sites in Flores, so as to gain knowledge from user communities concerning the sustainability and effective use of their water supply and environmental sanitation facilities;
- collate, analyse and report on the information gathered in formats that will satisfy the purposes of the assessment.

2.2. Approach, design and methods

2.2.1 *Methodology for Participatory Assessment (MPA)*

The methodology that was used in the evaluation is the Methodology for Participatory Assessments (MPA). The MPA combines the use of a collection of participatory tools with quantitative analysis to assess sustainability, use and gender and social equity of improved water supplies and sanitation programmes. The methodology was initially derived for a global assessment activity, the Participatory Learning Assessment (PLA), which was completed in 2000. Since then, the methodology has been developed further and has been

used in several programmes for evaluations and as a basis for planning and monitoring. More details about the methodology can be found in a forthcoming WSP publication[2],

2.2.2 *Participatory methods and tools*

An important part of the Flores study was the selection of the most appropriate set of tools to be applied. There had been considerable recent experience in applying MPA tools for various assessments of WSES activities in Indonesia. The findings from that experience have been incorporated into the detail of the MPA. Existing tools to measure the technical aspects of water supply and sanitation have been refined to strengthen the evaluation of the quality of construction, maintenance and use. Other existing tools from complementary packages (Venn Diagrams, Time Lines and Three Pile Sorting) have been incorporated and adapted for quantitative as well as qualitative measurement. The set of tools used in the study consisted of:

- Welfare classification, used by village women and men to categorize local households into better-off, worse off and intermediate groups;
- Social mapping of the access of these three groups of households to improved water supply and sanitation;
- Extended transect walk (newly developed), covering the construction quality, maintenance and use of the various parts of the water and sanitation systems;
- Timelines of the internal and external improvements of water supply, sanitation and hygiene in the project villages (added);
- Review of the types of local administrative arrangements, the managerial performance and the division of work, together with the male and female members of the local water management organization;
- Pocket voting and matrix voting on voice and choice in decision-making by women and men, use of water and sanitation systems and the division of labour, training and paid and unpaid functions between women and men, and the better and worse off groups in the villages;
- Three pile sorting to get the perceptions of groups of worse and better off women and men on good, neutral and bad hygiene practices and the relative ease with which they consider that the latter may be improved (added);
- Venn diagrams on the number of local and external organisations involved in water supply, sanitation and hygiene which are known to local women and men from better and worse off groups and how important these agencies are in the perceptions of the four groups (added);
- Benefit-cost perceptions of women and men improved water supply, sanitation and the participatory processes;
- Card sorting to establish who – women, men, better and worse off – have made which kinds of contributions to service establishment;
- Perceived impact of the projects on women and men;

Separate groups of women and men from the better and worse off community sections carried out the class and sex-specific evaluation activities of the above sequence. Evaluation of the management aspects was done with the female and male members of the local water and sanitation management organizations.

The evaluation included also broader stakeholder consultations. These consisted of one-day workshops in each Kabupaten and one additional one-day workshop at a central location for the whole island. The techniques used to conduct these workshops were also

[2] Mukeherjee, N. and van Wijk, C. (eds.) Sustainability planning and monitoring at all levels: a guide for the methodology of participatory assessments for managers of community-managed water supply projects.

participatory and consisted of various forms of voting techniques. Subjects were agency policy, and organisational arrangements and procedures.

2.2.3 *Study questions and assumptions*

To meet the above-mentioned objectives, the study was designed to answer the following questions:

- What is the current situation in the communities regarding water supply and sanitation, the interventions carried out, the institutions involved and their socio-organizational characteristics? Are there any significant differences between communities, regions, projects?

- To what extent are the facilities and maintenance, financing and management arrangements sustained over time? Have villages/households also made own improvements/ expansions?

- What positive and negative effects do the different groups see? Do they differ? How do the groups value the positive effects in the light of what they contributed and still contribute and the negative effects that they have mentioned? Are there any differences in valuing between the groups and if so, are they significant? Have workloads on water collection and hygiene changed for women and girls? Has this had other positive or negative consequences? Has there been any effects on women's decision making, e.g. attendance and speaking out in various kinds of meetings? [Note that differences cannot be attributed to the project interventions as there were no control groups in the project design].

- For poverty: What is the relative access of the poor to improved water supply and environmental sanitation? What are the reasons for those not served? How equitable were the investment contributions and how equitable are the local water tariffs? Who does not pay and why? To what extent did and do poor women and men participate in local planning decisions and in local water supply and management, during implementation and at present, in training and in unpaid and paid jobs?

- For gender: How equitable was the division of work between women and men during construction (who did what) and what has been its relation with decision-making and management (e.g. did/do women contribute and have a say?). What functions do women and men hold in maintenance and management and which ones are paid and unpaid? How is work in committees and maintenance of water supplies and latrines divided between women and men? How adequate are current water supplies in meeting the needs of women and men (quantity, quality, reliability, predictability); what is the equity of access to the different types of training for women and men? What is, in comparison to men, the participation of women in planning decisions and management functions?

The assumptions were that results in quality of construction, sustainability and use would be better where tools and scores would show that:

- men and women in the better and worse off sections had all contributed to service establishment (indicating a high demand);
- these groups had got a greater and more equitable say in a range of aspects for local decision-making (indicating a more demand-responsive approach of the project agencies);
- the resulting facilities and service met the demands of all user groups – women and men in the better and worse off community sections – to a relatively higher degree;
- the division of work and contributions between women and men and better and worse off households was more equitable

- the communities were more, and more equitably empowered to control and manage the service in terms of having functioning local organizations which manage village water supply and sanitation, with a more balanced representation of the poor and women, which has been able to control the quality of construction and contributions to construction in their village; has received relatively more equitable training in a wider range of skills and were practicing these skills, has established rules for using and/or managing and financing the water system and accounted for their management in an increasingly regular and democratic manner.
- the underlying agency approaches has adopted objectives, staffing arrangements, training and management and operation procedures that favour more participatory, demand responsive and gender and poverty sensitive approaches in the field.

An overview of the list of variables, sub-variables and indicators is given in Appendix 1.

2.2.4 *Sampling*

To obtain information that is representative, it is crucial that all communities and groups in communities have the same chance of participation in local assessments and scoring. In this study, a careful system of external and internal sampling was therefore designed. First, a stratified at random sample was drawn of sites in Flores where water supply and sanitation activities have been assisted since about 1994. The universe did not include the Government-financed emergency provisions after the 1992 earthquake, nor the relief schemes operating after the drought and other crises from 1997 onwards, the purpose was to compare between regular village water and sanitation projects carried out under three different programs:

- FLOWS projects: village water supply and sanitation projectsimplemented under the rural component of the AusAID-supported project across all five Kabupaten of Flores;
- WSSLIC projects: Village water supply and sanitation projects implemented under a World Bank-assisted project in two Kabupaten on Flores Island;
- Village water supply and sanitation projects supported by a local, national or international NGO: Yayasan Tana Noa, Dian Desa and CARE Indonesia.

The stratified random sample took into account the following aspects:

- Geographic coverage, with sites in all five mainland Kabupaten (districts);
- Project sites of the former FLOWS projects and sites supported by the other projects in that area;
- Size and complexity of schemes and scheme management, particularly for water supply systems, as there were single and multi-village schemes and villages which managed the schemes by themselves or shared management between several villages;
- Type of water supply technology. Projects installed mostly gravity -fed piped water supply systems, but in some cases also rainwater catchments for individual households or dug wells have been installed. For sanitation, no range of improvements was offered: all projects apparently introduced pour-flush latrines as the only technology option;
- Relative isolation: villages have been classified as having easy, intermediate and difficult access. Access was defined in terms of the time it took to reach a village, the need for one or more types of transport, and the nature of that transport. Locations on roads that required the use of a jeep, truck or motorcycle as the only means of transport, or that were accessible only on foot or by boat, or required a combination of several means of transport were rated lower than when the roads made it possible to reach the village directly by car;
- Ecological variation, with three types of conditions:
    - The western part (Manggarai and Ngada) has the highest mountains in Flores. The climate is humid with temperatures of 20-25^0 Celsius and high levels of rainfall, especially in Manggarai (3370 mm per year).

- The centre of the island (Ende) has intermediate temperatures and 1140-mm rainfall per year.
- The eastern part (Sikka and Flores Timur) has hot temperatures (32^0) and little rainfall. Larantuka has 770 mm per year. Most of the topography in the eastern part is coastal with a hot and dry climate. In villages around Larantuka, distances to springs are far and there is less potential to use them as a source for piped water. A lot of springs have an inconstant and low yield.

The fourth type of environment, small islands off the main island, has not been included in the sample because of limitations in time and budget. However, the sample included similar situations on the mainland (isolated villages with point sources).

Sampling in Flores had to deal with several other constraints and special requirements:

- The absence of a consolidated up-to-date list of communities. Precise data about the locations in which WSES projects were carried out were lacking, and subsequent re-definition and re-naming of villages provided an additional layer of complication. Thus, it happened that when visiting a village, the information on which sampling was based was found to be incorrect. This was solved by having extra villages for all sub samples included in the lists of randomly drawn villages. When the local situation meant that the study could not be carried out, a new randomly drawn village then replaced the old one.

- The scattered character of the information. Flores has six kabupatens, including one formed by a group of smaller islands. Water projects were carried out in all, and much information could only be found at district level. Even then, information was not always correct and the final decisions – including replacing some villages in the sample by others - could only be made through field visits.

- Village size and socio-economic differences. Most villages in Flores have 1000-1500 inhabitants, with 3000 people as the maximum. With small-scale farming as the main source of income, socio-economic differences have been small until recently. However, after the liberalization of the government economic policy, farmers in the western and central parts, which grow spices, coffee and cacao, have been experiencing an economic boom, while the other areas face an economic slump. The sampling by districts was designed to catch these differences. However, some communities were more isolated than others. Ease of access was therefore introduced as potential influencing factor, along with the proportion of upper, middle and lower strata in each community.

- Unplanned 'en route' villages. Sometimes, the pipelines of the gravity water supplies served one or two other communities which administratively did not fall under the project. They had therefore not been included in the original design. Often, these 'en route' villages were later still connected to the detriment of water supply to the tail-end communities. Sampling had therefore to ensure an equitable representation of both head and tail end communities irrespective of the original scheme designs.

The final sample was stratified by the broad ecological and socio-economic zones (which roughly correspond with the five Kabupatens mentioned above), the types of technology (piped and non-piped), the types of piped schemes (single or multiple village water systems), and the type of implementing agencies (bilateral, multilateral or NGO). In multiple village systems, arrangements were made to ensure that tail end and en route villages would be included. Figure 2 shows the sampling in progress. Appendix 2 contains the list of sampled villages and the guidelines used for sampling.

Figure 2 Sampling in progress

In Table 1, the result of the sampling is presented. Table 2 gives the distribution over the different districts and project implemeting agencies. Out of a total of approximately 260 candidate villages in the five mainland Kabupten for which some data was available, a full MPA was carried out with 55 villages. Of these, 52 had a fully implemented project. A detailed map with the location of the sample villages within the four *kabupaten* can be found in Appendix 1.

In six villages (Mocok and Koak in Manggarai district, Ulupulu village in Ngada district and Lamika, Nusa Nipa and Bantala in Flores Timur), the construction of the water supplies has never been completed, although the villagers have taken part in the planning and have contributed to the construction. In two other villages, Sinar Hading and Lewobunga, improved water supplies had been planned, but construction was never started.

Table 1 The study sample of project villages

	N
Total number of villages with completed water/water and sanitation projects	260 (approx.)
Villages in the sample with a completed improved water supply	52
Villages in the sample with an improved but not completed water supply	3
Total village sample (direct data)	55
Village with improved water supply not completed, access refused	1
Inaccessible villages with completed improved water supply[1]	5
Villages with planned supply not built	2
Total village sample (direct & indirect data)	63
Villages sampled are outside project area[2]	3

[1] Other villages with difficult access were included in the study [2]Due to re-drawing of district boundaries

Table 2 Distribution of sample villages by district and project agency Table 2

Project	District						
	Manggarai	Ngada	Ende	Sikka	Flores Timur	Total	%
FLOWS	9	10[1]	8[2]	10	15[3]	52	83
WSSLIC	2	4[4]	-			6	10
NGOs	1		2	1	1	5	8
Total	12	14	10	11	14	63	101

[1]8 full MPAs [2]7 full MPAs [3]In two villages, planned systems were not built [4]3 full MPAs

The study teams went also to Lamika, Nusa Nipa and Bantala. The villagers in Ulupulu were so strongly opposed to any visit that going there would have constituted a safety threat. The other two villages without completed projects, Mocok and Koak, were too difficult to reach, as were five others (Table 1). For these villages, the teams collected secondary information from key informants who knew the history of the sites. Secondary information was also collected for Sinar Hading and Lewobunga.

The reasons for the failed systems are the destruction of an intake by a local earthquake, faulty designs, and especially unmediated and unresolved problems about resource sharing (Box1).

Box 1 Failures due to natural disasters, design faults and absence of social mediation

Natural disasters, technical problems and especially a lack of social medication – are the main reasons for the failed sites. In Lamika, Nusa Nipa and Bantala, the villagers contributed to the project, but the new water system is not working.
Lamika is a tail-end village of a multi-village system. Water never came to the village because the spring capturing and transmission pipe in the last but one village on the pipeline, Lewokluok, was broken by an earthquake. Lamika has a small distribution net and public taps, but they have never been operational.
To *Nusa Nip, w*ater had come for just for 30 minutes while the system was under testing. The water teached the village border through the transmission pipeline, but it never came again and the public taps that were built in the village have remained dry. The reason was that Lamatutu, an en-route village in the spring area broke the transmission pipe. Lamatutu had asked the Nusa Nipa community to pay for using the water from the spring in the form of two virgins that would be married by men in Lamatutu without paying a bride price. In Flores Timur, the tradition of paying a bride price is still very strong and the price for marrying a virgin is high. Nusa Nipa refused that with the above result.
Water never came to *Bantala*, because there was a failure in the technical planning/ design and the water could not reach the more elevated areas. In addition, there was a war among clans to occupy the spring area. Water just flowed in the first 4 km of the 12 km long pipeline. Public taps have been built inside the village with contributions from the community, but they have never functioned.
In *Lewobung,* an improved water supply was planned, but not built because there were conflicts over the use of the spring. The spring owner asked a very expensive compensation. The community thought the price exorbitant and refused to pay. The conflict remained unsolved until the end of the project deadline. Meanwhile the community members had already contributed material and cash.
In *Sinar Hading,* water came just for a week, through the transmission pipe to test the system. The material of the transmission pipe was made from PVC which was laid across rocky terrain. Some pipes then broke because they were not suited to that condition. The community asked the project staff to change the pipe material for GIP (galvanised iron pipe), but the staff rejected their request. An additional problem was the poor water quality, because the source contained high levels of calcium. At the time of the failure, the public taps had not yet been installed. Distribution pipes had been laid for some routes (just a small scale pipe network without taps), but it is now broken in many places.
Source: Fieldworkers reports.

Although difficult access stopped the teams from visiting all sites, lack of accessibility was not a systematic bias which excluded the more isolated villages from the study. Thirty one percent of the villages with a full MPA could only be reached by jeep, truck, boat, motorcycle (with several falls) and/or on foot. Moreover, the percentage distribution of villages by ease of access is the same for the villages visited and the larger sample[3], which indicates that there has been no systematic bias on this factor. Figure 3 shows the difficult access to some of the sample villages.

[3] In total, information on ease of access was available for 59 villages.

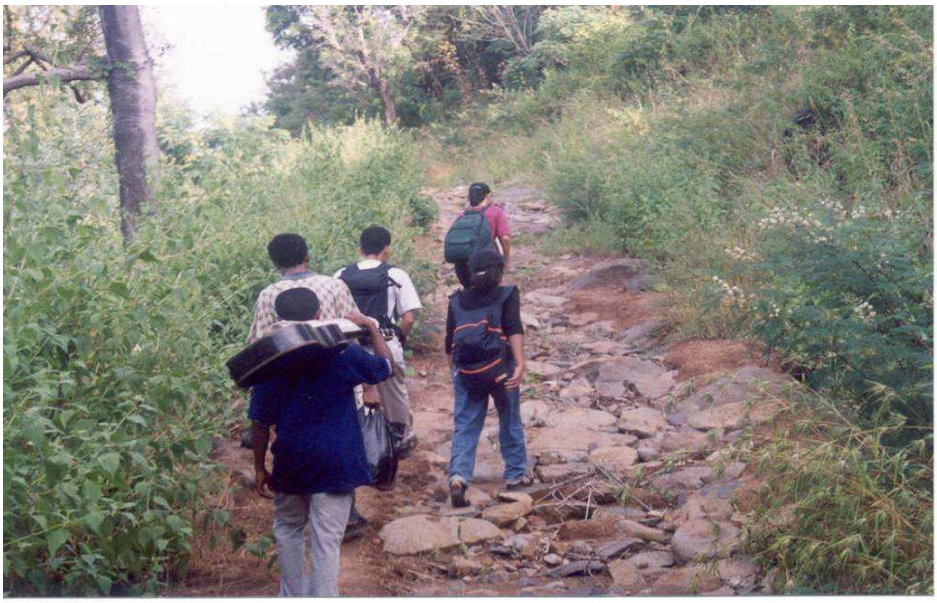


Figure 3 An example of difficult village access

Concluding, it can be said that maximal care was taken to achieve a proper sample under difficult field conditions. The above-mentioned limitations did result, however, in a slight under-representation of villages in multi-village schemes. This means that findings for these types of schemes need to be viewed with caution.

Sampling within villages

Many practitioners of participatory assessments assume that when participatory methods are used, every villager has the same opportunity to participate. In reality this is not the case. Information collected through participatory methods is easily biased, because those with less time and influence (which usually means women and the poor, plus other locally marginalized groups) are either absent or, when present, are dominated by participants with a higher status and influence.

For representative participation, a number of the above-mentioned tools were used with separate groups of women and men from the worse and better-off groups in the villages. A system of internal sampling based on the social map helped to invite specific households to these meetings to further enhance representativeness. The effectiveness of this strategy is reported in Chapter 6.

There were no restrictions for any person, woman or man, to join the evaluation meetings. Not only would this have been contrary to the aims of maximal openness and participation, but special measures were also considered unnecessary as separate meetings were held in poorer and better off sections of the community. Neighbours who came along to such meetings tended to belong to the same social and economic groups. Where it has occurred that members of the local elite joined a meeting to influence the proceedings and outcomes, the facilitators knew through training how to deal with such interventions and avoid distortions with the minimum of disruption (Box 2).

Box 2 Avoiding bias due to undue influence from local elites

While mostly there have been no problems of undue influence, it did occur that the local elite tried to dominate an activity or an outcome. This happened especially when they were of the opinion that other community members did not have the "correct" information or were not sufficiently familiar with the material. They also tried sometimes to consciously bias some of the scores. They would either try to lower them in the hope of getting more aid, e.g. in scoring the access, coverage and use in the social mapping and pocket voting, or to make them higher, e.g., on participatory decision-making during planning. When doing so, the elite exercised their influence not only in a verbal manner, but by their presence alone. The other women and men felt uncomfortable and lost the confidence to give their own score if their leader attended and acted like an observer. Moreover, in the Venn diagram, the community members could not expose that their leader had a limited role, if he (most were male leaders, CvW) attended the meeting. In order to solve these problems, the facilitators had to pull the leaders out of the meeting in a "polite" way, e.g. a facilitator (one of the two that were observers during the meeting) pretended to be interested in their views and engaged them in personal conversation. The facilitator then asked them to step out of the room under some pretext and so effectively withdrew them from the meeting.
Source: Quality control observations and fieldworker reports

2.2.5 *Data recording, review and analysis*

The collation, analysis and reporting of findings was carried out in stages by the teams of field facilitators, with appropriate guidance and assistance from trainers and MPA experts. The reporting stages were:

- Field reports (individual) for each site
- Consolidated field reports for multiple village schemes, where applicable
- Collated data for all sites (consolidated for overall analysis)
- Draft report, suitable for WASPOLA/ WSP-EAP and AusAID

The field reports were prepared in Bahasa Indonesia, while the draft final report was prepared in English. Because of the richness and quality of the data, the analysis contained in this report is not the maximum possible. Further use of the quantitative and qualitative data bases is possible for the benefit of future projects in the island as well as fine tuning the general policy. These uses are presented in boxes in various places in the report. To avoid mixing up with the boxes with qualitative data from the fieldwork, the latter boxes are not numbered and come without a heading.

All quantitative data were entered into spreadsheets. For the new tools on sanitation, hygiene, institutions and technology components, new scoring sheets were designed and reviewed. They were tested during the training, which included hands-on use of all tools and scoring sheets. The entered data were then reviewed and checked for completeness and internal consistency. This was an iterative process which continued throughout the analysis and the writing of the report.

For the quantitative analysis of the scores, the Statistical Package for the Social Sciences (SPSS) was used. This package serves for carrying out frequency analysis and testing correlations between variables for significant differences. When correlations are significant, they are not due to chance, but show interrelationships that can be accepted as the closest possible representation of reality.

This analysis made it possible to carry out the situation analysis, sustainability analysis, user satisfaction and analysis of gender and social equity aspects of the various project components, which are the objectives set out in Section 2.1. Further analysis of the

information on benefits as seen by the four groups – better and worse off women and men – as well as more in-depth case studies in villages with the most and least advanged equity conditions will make it possible to gain still more insight into the impacts of the projects on the conditions of women and the poor.

The qualitative data analysis consisted of the review of the fieldworkers' reports to identify the underlying explanations and other information that came up in the sessions with the various community groups. The analysis was complemented by a specific analysis of the ten communities with the highest and the ten with the lowest scores for effectively sustained services (water supply and sanitation). For this purpose, clusters of ten communities were chosen from the top and bottom ends of a list of communities where complete MPA assessments had taken place. The top ten were communities with scores ranging from 290 to 375, out of a maximum possible score of 400. The bottom ten communities had scores of 99 to 181. The mid-point score of 200 out of 400 is taken as a rough measure of the minimum required to indicate sustainability. By that criterion, all top ten had sustainable systems and all bottom ten did not. The communities and their aggregate sustainability scores are annexed in Appendix 3.

Both top and bottom clusters of communities were comparable in terms of population size, household distribution into social welfare classes (rich/poor/in-between) , proportion of poor households to non-poor households, and the nature of socio-economic gaps between the poor and rich categories of households. The large differences in terms of sustainability were thus unlikely to be associated with extraneous socio-economic factors. This has made it interesting to examine how user demands, responsiveness to these demands, village management capabilities, and the degree of gender and social equity in these factors, are associated with the final sustainability scores. The findings from this analysis, as well as details for specific cases, are reported in the numbered and titled boxes of this report.

3. Implementation of the Fieldwork

3.1. Study teams, selection and training

Ten teams of four members each facilitated the study. All teams had a team leader, who was either a woman or a man, had a technical or social background and prior experience using MPA in the field. In addition to these teams, there were ten reserve members. The teams acted as the MPA facilitators and recorded the data. They were supervised by two trainers from the training NGO, Pradipta Paramitha. The Jakarta-based NGO already had extensive experience in the use of the MPA in Indonesia and the Philippines. This organization also co-designed and implemented the training. A team of four support staff, also from Pradipta Paramitha, took care of the day-to-day coordination and logistic support and began entering the field data into a common data base during the fieldwork.

The selection of the field team members was based on five criteria and had the following results:

- a male-female balance as one condition for a gender approach. This resulted in a total of 26 female and 27 male fieldteam members;
- a mixture of social and technical expertise, so that all teams had at least one technical specialist;
- a mixed organisational background to ensure openness of approach, unbiased by particular organizational cultures and/or experiences. As a result, 38 facilitators came from different NGOs in Flores or the Universitas Cendana in Kupang, NTT while 15 came from NGOs in Java;
- Previous experience with participatory tools and methods. Each team had at least one team member who had worked earlier with the MPA.

To further avoid bias, team members who came from Flores did not work in their home areas. A list of team members and reserve persons is given in Appendix 4.

Prior to their fieldwork, the field team members got a ten days' training in Flores. For the programme, reference is made to Appendix 5. Normally, an MPA training would have lasted minimally two weeks. Because sixteen team members had previous experience of between six months and five years with the MPA and teams held peer learning sessions in the evenings both during the training and during the fieldwork, it was considered possible to shorten the upfront training.

The training itself consisted of short periods (2-3 days) of training in a local centre in Flores alternated with one day hands-on practice in a village. In total, there were four periods with in-centre sessions and three one-day sessions in the field. During the centre-based training, the participants got familiar with the MPA and its principles, learned to facilitate the tools and the scoring, and practiced the recording of the scoring and the qualitative information. For the hands-on practice, they went to the field in groups and practiced the tools and the process, including its gender and poverty sensitiveness, with women and men in nearby villages. These villages had not taken part in an MPA analysis before nor had they been venues for earlier training, so there was maximum learning for both parties and no risk of negative effects from overexposure to participatory methods.

3.2. Quality control and backstopping

Earlier experiences with the MPA have taught that the quality of work is not always sufficiently preserved. In the Flores study special emphasis was placed on preventing a number of previous weaknesses. This included the systematic record keeping of the numbers of female and male participants in each activity, checking the data for completeness and keeping proper records of qualitative aspects. Pradipta Paramitha

developed a single format for making field reports so that the quality and the contents of the records could be checked and compared. The preparation team also developed data aggregation sheets which made it easier for their field supervisors to check if, where relevant, the information was disaggregated by sex and welfare group. Another measure for quality control was triangulation, or comparing results obtained in different ways for internal consistency, e.g. for some of the technical data, financial accountability, drainage and access for the poor. The teams further had to spend quite some effort on explaining to local functionaries why the selection of communities had to be random and why it was positive that the sample included villages where the work had had lower or no success..

Within the WSP, two engineers, Ms. Ruth Waluhan and Mr. Richard Hopkins, supervised the process and contents of the fieldwork, with special attention to the techical aspects. Two outside MPA specialists, Ms Nina Shatifan and Dr. Christine van Wijk, shared the quality control and backstopping work, focusing respectively on training and fieldwork and on methodology and data analysis and reporting. Jeffry Simamora verified the statistical basis for the existing analysis and checked whether this might have been more sophisticated.

4. Water Supply, Sanitation and Hygiene Conditions and Practices

4.1. Socio-economic conditions in the study villages

Poverty is not simply a matter of having less money. It is a stage in life faced by many people, sometimes for a short time and sometimes for generations, and often involves a combination of factors, such as no employment, a low level of education, low access to and control over resources, poor health and a particular marital status. Poverty also has much greater implications than a lower capacity to pay for one's basic needs. Poor people tend to have less and poorer quality food, fewer assets, less security, a lower mobility, and a lower self-respect and respect from others.

These factors mean that not only can they contribute less, but they also have less access to information, find it harder to attend and speak out in meetings, and find that their views, if expressed, often count less, if at all. Poor women, who also face gender constraints, face even greater barriers than poor men. The definition quoted by the World Bank and taken up by other agencies (e.g. DFID[4]) that poverty is equal to having less than 1 US$ per day for basic necessities is therefore too limited and is not used in the MPA.

Poverty is also a relative concept. Households that would classify as poor in central Java may well belong to the better off in the least developed areas of Flores. Nor are all communities and regions within Flores equally poor. The MPA therefore uses the people's own definition of what constitutes a family which is better off or not well off in life in that participar community[5] and what it means to be in-between. Table 3 contains an overview of the most common characteristics that emerged in participatory welfare classification in Flores.

Table 3 Indicators for different levels of household welfare in the study communities

No.	Indicators	Poor	In-between	Rich
1.	House	Temporary house with plaited bamboo wall and plaited grass roof. Have no electricity. Use torch as lamp.	Semi-permanent house with half brick wall, and zinc roof Some people have electricity	Permanent house with brick wall [and electricity]
2.	Land ownership	Have small plot or have no land at all. Work as labour for landlord.	Have land (1-3 ha) with cocoa, cashew, kemiri (a kind of nut) trees. Work by themselves.	Have more than 5 ha land with cashew, kemiri, cocoa, coconut trees. Work by themselves or pay labour.
3.	Ownership of water and sanitation facility	Have no private water and sanitation facility. Just have dry pit latrine or temporary latrine.	Have semi-permanent latrine with half-brick wall.	Have private bathroom Have private latrine Some have house connection (if there is house connection in village)
4.	Ownership of household equipment	Use simple clothes Have very simple household equipment	Have simple household equipment with some electronic appliances (TV, radio)	Full furnished house with complete electronic appliances (TV, VCD, Parabol, etc).

[4] Department for International Development, 2000. Achieving sustainability: poverty elimination and the environment. Strategies for achieving the international development targets. London, U.K.: DfID

[5] The terms 'rich' and 'poor' are avoided during the sessions as they are quite stigmatizing, although they are used for convenience' sake in this report.

5.	Type of work or employment	Daily farmer (paid daily as farm labourers) Labour for landlord.	Farmer	Farmer on own fields or landlord/ landowner. Civil servant
6.	Education Level / Skill	Elementary school, in fact a lot of them do not graduate from elementary school as they have no money to pay school fees.	High school	Generally until high school, some can deliver their children to university.
7.	Pattern of food consumption	Eat 2 times per day with simple menu (not good nutritious food) Lack of nutrients.	Eat 3 times a day with simple menu (rice, cassava, corn)	Eat 3 times a day with nutritious food (complete menu)
8.	Number of family member	Have a lot of children (big family)	Composition of household is 3-10 people	Have small number of children (3-5 children) and follow family planning program
9.	Livestock	Have chicken and 1-2 pigs	Have 3-5 pigs	Have a lot of livestock (chicken and pigs) more than 5
10	Health			Can go to community health centre / midwife to get treatment

The analysis of the people's own classifications, with many non-monetary indicators, showed that out of 52 villages where welfare ranking was done, 89% had households in all three groups. In Nirankliun, the villagers identified four categories: better-off, middle class, poor and *very poor* (Appendix 6). The rankings also revealed a great variation in socio-economic conditions. Five villages, Lewokluok, Kawalelo and Lewokluok/Koliwutun in Flores Timur and Wolomeze and Woko Deko Roro in Ngada, had only poor and somewhat better-off households. On the other extreme are Bajak and Beawaek I in Manggarai and Wolowele in Sikka, which classified themselves as having no poor households under the local criteria. Wailolong and Mokantarak are other more prosperous communities, with high proportions of better-off and middle class households and virtually no or very few poor families according to the local standards.

District-wise, there were no large differences in the sample as far as welfare rankings are concerned. The villages in Manggarai and Flores Timur have slightly fewer poor families, and Sikka slightly more than Ngada and Ende, but the differences were not statistically significant. Ecological zone and ease of access also made no significant difference.

Further data analysis and use
It is possible to carry out a further content analysis of the drawings and the listed characteristics of the three welfare groups. Such an analysis might show which characteristics are common for each group in the whole are, and which are village- or area-specific. It can also show up qualitative differences between and within districts and for more and less isolated villages and explain what the nature of such differences is. Finally, an in-depth study may compare the validity of the community-defined indicators with the much more general and country-wide indicators of poverty that are used in Indonesian government statistics. If, as earlier studies indicate[6], the village data are more reliable, the welfare classification tool will be an excellent tool to use in targeting future project design to the poorest communities and to the groups within these communities.

[6] Walujan, Ruth, Hopkins, Richard, and Istandar, Aire (2002): Sanitation in Wonosobo: Two Evaluation Approaches Compared; Woodhouse, Philip (1998). People as informants. In Alan Thomas, Joanna Chataway, & Marc Wuytz, (Eds.), Finding out fast: Investigative skills for policy and development (pp. 86-146). London: Sage Publications and The Open University.

4.2. Domestic water supply: interventions and results

4.2.1 *Types and conditions of community water supply systems*

Various project agencies have helped villages in Flores install different types of improved water supplies. Table 4 gives an overview of the type of water supplies built and their level of complexity.

Table 4 Distribution of study villages by district and complexity of improved water supply

Complexity of domestic water service	District					
	Manggarai	Ngada	Ende	Sikka	Flores Timur	Total
Single system managed by single village	7	10	4	8	9	38
Multiple system managed by single village	1	1	2	2		6
Single system, multi village managed	2		3	1	1	7
Multiple systems, multi village managed			1		3	4
Total	10	11	10	11	13	55

Data for full MPA villages only, N=55

Most common in the sample are single village systems. The majority of these systems were built under FLOWS (see Table 2 in Section 2.2.4). Only in Ipir and Hepang in Sikka were villages assisted to install dug wells and rainwater catchment systems for individual households as this was easier than solving problems for a gravity supply (Box 3).

Box 3 Reasons for a different technology in Ipir and Hepang

Both Ipir and Hepang are located in a dry area and both have had rainwater catchment projects already in the past.
Ipir has used dug wells and rainwater catchment since the Portuguese conquered the island. It has a piped system from the district Water Enterprise (PDAM), but this covers just the village border area. There is a small river, but this cannot be used as a source for a piped supply because it has a small yield. There is also a spring 2 km from the village, and the FLOWS project team surveyed the area to identify a pipeline route, but it later cancelled the piped water supply project, because the community that lives near the spring didn't give permission to access the source. At the time, the project support staff made no efforts to help the two communities solve that problem.
Hepang has springs and a small river, but they have an unstable yield in the rainy and the dry season. A lot of projects helped Henang households to install rainwater harvesting tanks. FLOWS supported both villages to do the same. The choice was confirmed in village assemblies in which both women and men participated.

Of the gravity systems, one third are of a more complex nature, especially with respect to their management. They consist either of several piped water supplies in one village or one or more piped water supplies serving a number of villages who together manage the service (Table 4).

The evaluated water supplies were all between three and eight years old. The average age was 4,8 years.

4.2.2 *Functioning of the installed water supplies*

In the MPA, women and men users evaluate the quantity and quality of water delivered in the wet and dry season and the reliability of this delivery by means of rope voting. This is done in a random sample within the village (or a stratified random sample, if households live in better and worse neighbourhoods) and with representation of both upper and tail end stand posts in piped systems. The members of each group do the actual scoring by positioning themselves along a rope which represents a 0-100 scale. Zero indicates there is no water at all and 100 indicates a perfectly satisfactory situation. The method means that there can be a considerable variation in averages between and within villages. More detailed analysis is needed to catch the finer nuances of the situations. In this report, the overall picture is presented.

Opportunities for further analysis
The scores used for this report are means, and therefore indicate the average situation per villages. However, the underlying scores for men and women in different locations are available for further analysis, to see whether experiences of women and men differ and to what extent the situation varies with the villages. Further analysis is also possible of the reasons why people scored services as they did.

a) Quantity of water supplied throughout the year

The quantity of water supplied differs considerably between the seasons. In general, the water quantity of the improved water supply in the dry season is only barely acceptable. The most frequently occurring village score (mode) was 50 and the average score was 59, while the median (the central score in the range for all villages) was 62. This and the relatively low standard deviation (28) indicate that the situation does not differ too much between the individual villages.

The same scores for the rainy season show that the situation is then better, although not yet optimal. For this season, the mode (most frequent score) was 90, the median (middle value in the total range) was 80, and the average score 72.

This situation may be related to the philosophy of project agencies that providing some water is better than no water, but as will be seen in section 4.3, it has strong implications for water use and its related health and development aspects. The findings in Flores further indicate that the above philosophy is shared among water project support agencies as no significant differences in results on water quantity scores were found for FLOWS, WSSLIC or NGO supported projects. It is further remarkable to see no differences between wetter and drier ecological areas. This indicates that the designs, rather than the ecological conditions determine the adequacy of water quantity.

b) Water quality

The situation on the water quality, as experienced by women and men users, was much better for the dry season, with an average score of 85. In the wet season, the average drops to 63, mainly due to turbidity problems. In a small number of villages with quality occur in either the dry or the wet season; only Kringa has problems throughout. Apart from Kringa, all problems with water quality occurred due to poor quality of work during construction (Box 4).

Is the water safe to drink? In most villages (62%), the drinking water had never been tested on its quality, as far as the users knew. In the remainder, the water has occasionally been tested, but in only two villages (Watotutu and Bantala) did the users know the results of the tests.

Box 4 Construction quality, catchment area protection and water quality problems

In the sample, the villages of Hepang and Kringa have serious problems with water quality in the dry season and Arus, Inelika, Tenda Toto, Gera and Kringa in the wet season. In *Hepang*, the reason is the dust and dry leaves in the water storage tank. Sometimes a rat has fallen in and drowned. This all happens because there is no permanent cover over the hole of the tank. Furthermore, the sunshine sometimes shines inside which accelerates algae growth.
In *Arus,* the intake has been built in the middle of the river and the construction is below the water level in the rainy season. When the river begins to overflow, muddy water enters the intake. There is no good filter system, so the water becomes brown and dirty. In the wet season the water from the intake cannot be used at all.
Inelika suffers from a poor quality of water because the spring has not been protected during construction. This spring is located under a big tree. The intake has been built near the source and in the wet season the water carries leaves from the tree and mud from the river.
In *Gera,* the intake and the reservoir have also not been well covered. Furthermore, the degree of erosion around the intake is high. During rains, soil and sand enter into the intake and pollute the water.
In the wet season, the system of *Tenda Toto* doesn't work because the intake clogs up. Its height is so low that in the rainy season, the river overflows it and mud enters inside the intake. In addition, the intake was built near a cliff. In heavy rains, the cliff erodes and its soil enters into the intake.
The water quality in *Kringa* is low throughout the year, because the source has changed into a hot water spring through a natural volcanic. As a result, it couldn't be used anymore. The whole system now doesn't work anymore.

c) Reliability and predictability of the water supply

The mean scores for the reliability of the water supply in the dry and wet season were above average (66 and 79). Most villages get water every day, and slightly over half of the systems in the dry season and 60% in the wet season have water for 24 hours per day. There are, however, a number of exceptions. In Compang and Tenda Toto, serious problems occur in the rainy season. Woko Deko Rono and Kringa have serious problems throughout the year.

A more widespread drawback is the unpredictability of the water supply. When the users go to the taps they do not know whether they will find water in them or not. Women and men reported this problem in 19% of the villages for the rainy season and in 27% of the villages for the dry season.

4.2.3 *Quality of installation*

a) System design.

One reason why some of the systems are not functioning well is the quality of the technical design. In participatory transect walks and focus group discussions, local women and men and a technical person from outside reviewed the design. Both groups agreed that designs were not optimal. According to the villagers, 10% of the water schemes had a good design and 10% had major flaws. From the technicians, these percentages were 5% and 37% respectively[7].

[7] Different scores from women and men with data on the faults and problems which each group detected are available and await detailed analysis.

There was a significant agreement between the views of the users and the technicians' scores on whether a design was good, intermediate or bad, correlated at r=.40**. This means that in 16% of the cases, users and technicians agreed and that the chance that this is a statistically wrong conclusion is less than 1%. The agreement was especially high for the poorest designs. In seven of the eight cases where the users scored major flaws, the technician gave an equally or almost equally bad score.

A frequent problem was the design of the reservoirs. Their design is technically too unsophisticated and as a result, they do not prevent that mud from rainwater clogs the pipes during the rainy season. Cleaning intake screens as part of local maintenance is a condition as well, but is in itself no realistic answer to shortcomings in design and installation.

b) Modifications of original designs

Many rural water supplies have been modified during or after construction. Of 52 completed water supplies, over half of the systems have been adjusted. As such, these modifications may be positive or negative. Villagers have for example made private connections or connected en-route villages which had not been planned for in the design.

Modifications of the original designs have led to poor water pressure in the entire system in about one quarter of the cases according to women and men users. This comes especially from private connections which previously have not been planned for. Overall, there were frequent reports of illegal, unchecked connections as well as more legitimately (formally) made connections than the systems were designed for.

c) Quality of materials and workmanship

The focus groups also rated the quality of materials and workmanship. According to women and men community members, 80% of the systems were constructed with good materials (45% flawless), while in 60% of the villages the quality of work had been acceptable to good. Some 10% of the water supplies had serious flaws in quality of materials and/or construction work, detected especially by women (Box 5). Most problems stem from the use of to low-quality materials such as poor PVC pipes that break easily and get holes, thus making illegal channelling from the planned pipes easier.

Box 5 Gender differences in observations on the technical quality of improved water supplies

Water supplies that scored lowest for technical quality were those where either the community men, women or both reported more than 4-5 major flaws. Where both groups identified such flaws, women generally identified more flaws than men. Flaws in the low score communities of Nirangkliung, Wololele (piped) and Hepang (rainwater harvesting), for example, include lack of workmanship, poor quality of building materials, poor drainage, and no monitoring or follow-up of the system after construction The latter has often led to the uncontrolled installation of house connections that disturb the water pressure. These flaws were also reflected in low scores given for water quantity. The women in particular pointed out that the deficient conditions affect the water quality adversely as well. Although there is clean water available during the dry season, during the rainy season muddy rainwater creates blockages in the systems. That water is not fit for cooking and drinking purposes – although ample is available for washing and bathing. Source: Field reports

Better designs tended to have also better quality materials and workmanship, although the correlations are not very strong (.42** and .34**). This may be a reflection of sites which happened to have more attention or a higher standard of technical assistance from the project or more control by the village in either the design or the implementation stage, but not both.

None of these aspects showed significant differences between villages that could be related to the different project agencies. Ecological conditions, complexity of water supply system, age or easiness of access also did not play a systematic role. The lack of correlation with system complexity is somewhat counter-intuitive, as such schemes are typically more "technical" in nature. Possible explanations are a relatively greater attention from the implementors to these schemes and their relative underrepresentation in the sample.

4.2.4 *Extended technical analysis*

In the Flores study, an additional scoring system was developed to measure the quality of construction and related use of the various parts of the scheme. Special steps were developed to establish a joint team of technicians and village women and men to carry out this 'extended transect walk'. Apart from adding a more technical evaluation of the quality of the design, construction and functioning of the water supplies, the objectives were:

- to enable two way learning between villagers and technical specialists;
- give village women and men equal access to information about their water supply;
- equally recognise and record local women's and men's knowledge of the micro catchment area, water source and water system;
- encourage exchange of knowledge between village women and men on their water supply and catchment area protection (horizontal learning).

The aspects which the teams evaluated were the uses of the catchment area, and the risks these might have for the quality and quantity of the water in the source (discussed in more detail in the next section); the quality of construction, maintenance and management of the spring capturing, or alternatively, the intake from the stream or river; the quality of construction and problems with leakage and/or vandalism in the transmission pipeline; quality of construction and maintenance of the storage/break pressure tank; quality of installation, maintenance and management of the distribution network; and pressure at public taps and house connections, both in a sample from the social map, as well as problems of quantity, functionality, leakage, drainage and illegal connections.

The average scores for the technical components of the water supplies are presented in Table 5. Of the 52 completed water supplies, 39 have a spring intake and 12 a stream. One village, Watotutu has one system with one intake but from two water sources, a spring and the river. The reason is the low water debit from the spring. The spring caption is therefore connected to the intake in the river. From this intake, the water goes into the transmission pipe.

In general, there were fewer problems with spring capturing than with intakes in river and streams. Ten spring catchments, or 26%, had a positive score for all sub-indicators, against one (8%) of the intakes in streams and rivers. The transmission pipeline and the distribution network with the public taps are the weakest links in the chain. Which aspects are especially responsible for the low scores can only be identified through a more detailed analysis of the scores, however.

Table 5 Average scores and standard deviation for technical quality of scheme components

Component	Average score	Standard deviation
Spring catchment/bron capturing	78	24
River/Stream intake	53	26
Transmission pipeline	54	26
Break pressure/ storage tank	74	21
Distribution net	43	26
Public taps (random sample)	54	24
Private taps (random sample)	79	15

N=52 villages

Not surprisingly, the study showed that systems with a better design and construction quality also function better. They tended to supply a more adequate quantity of water in the rainy and especially the dry season, were more regular in both seasons and provided water for a greater range of domestic uses (correlations of .48**, .52** and .55**). Triangulation showed internal consistency for the technical data: the system quality scores of the users in the focus group discussion were significantly and positively correlated to all results of the extended transect walk except for the break pressure/storage tank. Correlations ranged from .35* to .97**. This is a good reassurance of internal quality control of the data.

An important finding is further that where villages had had some control over design and construction, the quality of the works was significantly better. This relationship is not very strong, however (.28*) as the communities had control in only four of the cases with better construction results.

Opportunities for further analysis
The current report only contains the total scores per technical scheme component as a percentage of the maximum number of positive scores that could be obtained. The underlying data base contains many valuable details and deserves a separate analysis. For each component, specific information is available on construction, maintenance, use and management aspects. It may be possible to lift these sub-indicators out and integrate them into the overall analytical framework of the MPA. This may well give new insights on the factors that influence the sustainability and effective use of community-managed rural water supply services and improved sanitation and hygiene. The first analysis explains between some 16% and 25% of the found variations. This more detailed analysis would be a major research and might well serve as the basis for a Masters or PhD thesis fora motivated student researcher.

4.2.5 *Environmental sustainability*

Local managers and users of village water supplies are increasingly affected by the ways in which members of their own community as well as others use and manage the water catchment areas. Furthermore, designers, implementers, managers and users of new water systems may also cause environmental problems themselves, particularly with regard to drainage. Both source and drainage conditions are assessed as part of the MPA.

a) Water quality in the water source and nature of contamination

In 70% of the cases (39 villages), the users considered their source to be free from contamination risks such as agrochemicals, industrial waste, and human and animal excreta. In ten villages or 18%, it was thought that one of these contaminants is sometimes present in the source. In the remaining six villages – Pedha, Woko Deko Rono, Tenda Toto, Hepang, Lanika and Bantala – the users thought that the source might be quite polluted due to the contamination risks present and a lack of protective measures.

The aspect of a reliable good water quality, without the need for treatment, has been a prime motivating factor in seeking spring sources for piped village water supplies, however distant that spring might be, as it is possible to enclose and protect a spring source, and keep it protected in pipelines all the way to the tap. Also rainwater, when properly collected and stored, has an excellent quality. By contrast, surface water, even high up in stream catchments, is typically contaminated with human and animal wastes and agricultural runoff, and as catchments are deforested the turbidity of streams increases.

From other research it is known that there is a close agreement between users (especially women) and engineers in ranking different water sources on their water quality. Where users have competing options, springwater is generally preferred, followed by protected wells or wells shared by a known group of users. Surface water sources tends to come last because of the many polluting activities taking place in them, such as bathing, washing, and cleaning vehicles[8]

However, much depends on the quality of construction. As was seen above, and elaborated in Box 6 below, this quality leaves much to be desired, in the case of springs as well as rainwater reservoirs. It is therefore not surprising that in the user scores, projects using springs and rainwater reservoirs did not perform significantly better on perceived water quality of the source than projects using surface water.

Box 6 Safety of drinking water in rainwater storage tanks: the users view

In the rainwater project in Hepang, the users identified several contamination risks. The manhole covers of the tanks do not effectively cover the stored water. Sometimes only a single corrugated iron sheet is placed on top, which increases the chance of external contamination. Sunlight is able to penetrate into the reservoirs, which is thought to speed up the growth of mould within. Collection pipes are often left uncovered, and in the dry season when the waterflow is less, animals such as rats and snakes can enter the pipes – and die inside. In addition, the rainwater often enters the tank without passing a filter, thus adding to the risk of contaminants. According to users, apart from physical maintenance such as frequent draining and cleaning of the reservoir and pipes, other possible solutions to the contamination problem include adding disinfectants to the system, such as lime and sodium. However most rainwater tanks have never been cleaned since they were built. Some had been cleaned only once, the rest about once a year. Source: Field report

b) Water quantity and reliability of the water source

Three quarters of the villages with an improved water supply get water from a perennial water source. The other villages suffer from sources that dry up during part of the year. In the best case, in Bajal in Manggarai, Beramani in Ende and Nusa Nipa in Flores Timur, this happens only at the peak of the summer and lasts for one to two months. In the worst cases, in Wawowae, Woko Deko Roro, Watotutu and the two villages with rainwater harvesting, Ipir and Hewang, the period without water from the improved supply may last from anything between three and six months or more.

Whether the period is long or short, having to physically carry all domestic water from an often much more distant source during the hottest months of the year, with average temperatures of up to 32 degrees Celsius, is a hardship in all cases. Such occurences are highly locally specific as the data showed no significant relationship between source reliability and the more general ecological conditions (rainfall, temperatures) of the different parts of the island. Instead, poor construction of the water systems is identified as the main reason for water shortages in these communities.

This was an unexpected finding, as the combination of participatory processes, tapping local knowledge, with good technical assistance from outside, provided by the project, should lead to substantial increases in quantity and reliability of water supplies. One possible contributory factor is the common practice of overestimation of (and not physically measuring) the quantity and reliability of flows in springs and streams at the planning and design stage.

[8] Wijk, Christine van (1998). Gender in water resources management, water supply and sanitation: Roles and realities revisited. Technical paper No. 33-E). The Hague: IRC International Water and Sanitation Centre.

Box 7 Users' evaluation of technical flaws influencing water availability

Bad quality pipes and poor workmanship have led to an unequal distribution of water with some areas of the village effectively cut-off, and the consequences are suffered mostly by the women (*Watotutu*). In *Ipir*, the rainwater storage reservoirs are small.They do not contain enough water to meet basic needs in prolonged dry seasons, and their construction is shaky, with some parts having thicker walls while other areas are thin. Furthermore, there is no drainage around the reservoirs. Excess water can escape only through poorly-built overflow pipes. As the reservoirs are small, much water escapes through these pipes during the rainy season which is not channelled and gives a lot of water wastage. The rainwater collecting system in Hepang is used very little, due to the poor water quality. Most community members, rich and poor alike, use alternative water sources for cooking and drinking purposes.
Source: Field reports

c) Catchment areas

The scoring system used for catchment areas was the percentage of observed 'good conditions' for a total of 15 subscores. These covered signs of deforestation and erosion, cattle grazing, crop irrigation, pesticide spraying, fertilizer use, mining, washing and bathing, human excreta disposal, visible contamination as well as local knowledge of seasonal variation in quality, drying up of the source and instableyield. Also source ownership (and conflicts over such ownership) and use by other schemes have been included.

At present, the study shows that problems in the catchment areas are not yet over-serious. Overall, 86% of the villages had a score between 50 and 90 (maximum score for good conditions was 100). Only three villages, or 6%, had major catchment problems. No problems at all (score 100) exist currently in four villages (8%). The problems that exist affect, as seen above, especially the quality of the water in the supplies. It should be noted, however, that in this finding, the villages in which construction was abandonned because of serious and unmediated problems over source sharing are not included. Furthermore, the above picture is likely to change with increasing demographic and economic pressures to increase production and habitation in the catchment areas.

d) Drainage of waste water

Drainage of waste water is a weak point across the board and differences between the implementing agencies are small. Figure 4 gives the diagrams of the drainage situations in villages where the different type of agencies have helped to install improved water supplies. The darker the colour, the worse the drainage conditions.

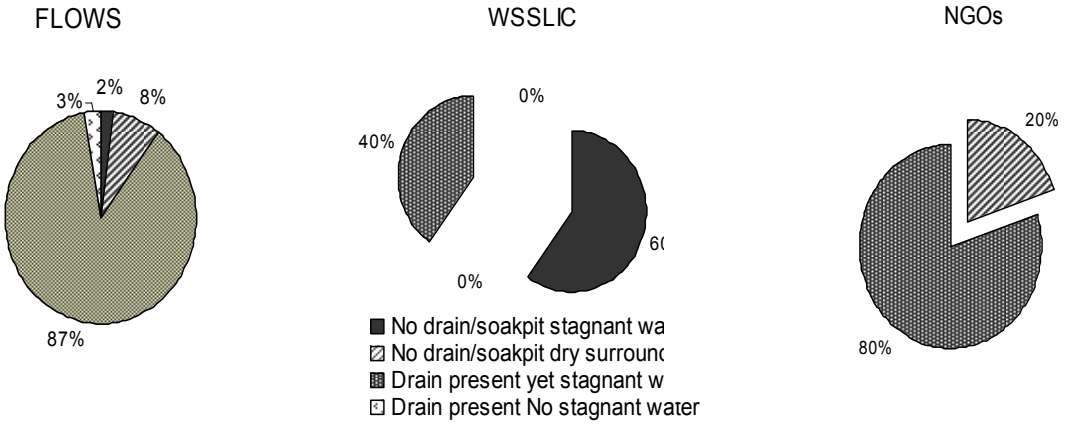


Figure 4 Tap drainage conditions by project agency

The figure shows that, irrespective of which agency supported the communities, drainage conditions are 'black' (no drains built *and* stagnant water at waterpoints) or various shades of gray: drains built, yet stagnant water, or no stagnant water, but no drains either. FLOWS and NGO supported projects usually had drains, but with stagnant water. Projects built under WSSLIC more often had no drains, but the differences were not significant. A good situation – drains and no stagnant water – was only found in 3% of the FLOWS villages.

4.2.6 *Community financing and financial management*

An important part of the sustainability of community managed improved water supplies is the financial sustainability: the availability of financial resources to cover post-construction monetary costs and their proper financial management. With members of the local management organizations, the teams looked at cost coverage, payments, tariffs (including their social equity), financial management (budgeting and accounts) and accountability.

The different financing systems in the villages are presented in Table 6. Apart from the 11 villages where schemes were started but not completed, only one village, Golo Sepang in Manggarai, did not have any provisions for payments of the operation and maintenance costs for reasons set out in Box 8. Six villages get an external subsidy although they cover some of the costs themselves. The other 45 pay, or rather intend to pay, for the costs of operation and maintenance without any external funding. One village relies on local taxes/revenue. Four villages depend on a combination of user fees and village revenue and 40 villages charge users directly.

Table 6 Range of financing arrangements for operation and maintenance

Type of local financing system	Number of villages	Percentage
No provisions for recurrent costs	1	2
Shared financing (some external subsidy)	6	12
Local financing from taxes/other revenues	1	2
Combination of taxes and direct user charges	4	8
Direct user charges	40	77
Total	52	101

N=52 villages

Box 8 No provisions for recurrent costs: Golo Sepang

Golo Sepang does not have a managing committee. Planning and construction of the system were entirely dealt with by the project team and the local leaders. A group of men from both rich and poor classes was appointed as the managers of the facility without the knowledge of the rest of the community. The BP is so far not "active" as the responsibilities have yet to be established within the group. There was no formal announcement or agreement regarding payments, and contributions to constuction were made on a voluntary basis, without sanctions for defaulters.
Source: Field report

- *Do all users pay?* Fifty one villages have made some arrangements for payments for operation and maintenance, with 40 relying only on user charges. However, actual payments are only asked in 22 villages (43%). In these villages, all users pay in only six cases (12%). In ten villages (20%), most, but not all, pay while in six cases (12%), only some people pay. In the other 29 villages, people are either not asked to pay (24%) or are asked but do not pay (33%).

- *Do payments cover the recurrent costs of the service*? None of the 51 villages with local payments for operation and maintenance cover all recurrent costs (here defined as the costs of operation, maintenance and repairs, and ideally also depreciation). The best performers are currently the five villages (10%) which cover the operational costs plus some, but not all, repair costs. One village (2%) covers the operational costs fully. Fifteen others (29%) cover some, but not all, operational costs. Thirty villages (59%) have serious shortages in covering operational costs.

- *How equitable is the payment system for O&M*? It was seen above that the participatory welfare classifications showed that all villages have two and most three major welfare groups: poor, middle class and better off. Such variations in welfare are an important factor when planning financing systems for improved water supply and sanitation. Socio-economic levels of village households are for example important when setting water tariffs for unmetered water supplies because the amount of water consumed increases with a higher socio-economic status.

  In seven villages, everyone pays the same amount, although from Table 7 it can be seen that all have a mixture of households which are better and worse off and three villages have a high percentage of poor people. From the qualitative data, it was seen that in local circumstances, there are substantial differences in household size, income and livelihoods between these three groups, as illustrated also in Box 9 below. Moreover, in four villages, water is used also for productive purposes. In none of these villages, the flat tariffs are further related to the actual costs of running the water service.

Table 7 Vast socio-economic differences in villages with flat tariffs

Village	% better off	% middle class	% poor
Bajak	13	87	0
Coal	12	23	65
Wolomere	0	21	49
Wolotopo	19	68	13
Lewokluok	0	10	90
Wailolong	24	72	4
Lewohala	8	83	9

Fig. 5 Social and Economic Benefits Ladder

In four other villages, everyone has to pay the same amount as well, but the amounts are based on actual operation and maintenance costs. In all these villages, no one pays however, and systems are slowly decaying as there is no money to cover any maintenance costs. Here also, all village populations are socio-economically mixed and in three of these villages water is again used for small-scale productive uses within the household economy (Fig. 5).

The phenomenon of flat tariffs and charges or charges according to the number of members in the households reflects a project rule of encouraging users to pay according to consumption. There is, however, no direct link between the amount of water used and the charges made. Therefore, the approach has an inherent bias against the poor, who have the largest families, yet consume less water than middle-class and better-off households. The latter have lifestyles that raise water consumption: more clothes, utensils, and vehicles to wash, more toilets and bathrooms, larger houses to keep clean, and more land for vegetable gardening, fish ponds and other productive uses, but they do not pay for these lifestyles.

Equal (flat) contributions without considering capacity to pay always penalises the poor. This goes also for a fixed percentage as contribution to capital costs, which was a project rule in the WSSLIC projects. Those benefiting most often justified the same payments for all with glib phrases like "we are all equal when it comes to water". Meanwhile, they often get more benefits (private taps, or public taps near their houses, productive uses of water) for amounts that weight far less on them than on the others.

Box 9 Equity in payments and sustainability of the water supply

At the top of the list of the ten best sustained village water supplies are *Wuliwutik* and *Wolotolo*. Villagers in *Wuliwutik* (sustained service score 374/400) agreed that the richest in the community should contribute most. The male local leaders decided on a system of contribution for construction graduated according to people's financial abilities. Allocation was according to the social classes identified in the community:

- Farmers : Rp. 10,000
- Employees/Wage earners: Rp. 25,000
- Business owners: Rp. 100,000

Business owners also contributed by providing vehicles for the transportation of materials. Payment of operation and maintenance cost is also weighed, but according to number of consumers in the household – a project recommendation which, as set out in the text below, actually has negative implications for social equity.

In *Wolotolo* (sustained service score 374/400), the picture is the exact opposite. For recurrent costs, users pay as in Wuliwutik, but payment is adjusted to the financial capacity of the households. However, for construction, a set amount of payment (Rp. 20,000) was charged to every household, despite vast differences in payment capacity Characteristics of the better and worst off households in the community are:

Better-off (16%)

- Land owners with approximate yearly income of Rp. 6.5 million
- Getting home connection of clean water – homes have latrines
- Permanent houses
- Average of 4 people/household

Worst off (16%)

- No land or fixed income
- Water supply through public water tap
- House of poor quality (eg. roof made of coconut leaves)
- Average of 6 people/household

Characterics of intermediate households (64%) are in between these extremes.

Fixed contributions for all can result as a disincentive for the poor to want to sustain the service, as was seen in *Watotutu*. The amount of user contribution decided upon was Rp. 1000/person/month. When the management committee implied that the monthly contribution would have to increase significantly for repairs to the system, the poor started to demand a refund saying that they did not want to be users any more.

Source: Top and Bottom Ten analysis

- *How good is the local budgeting?* Of the 52 communities with a completed water supply project, some 60% do not make budgets. Twenty one percent does not budget for all costs and may also not budget regularly. Only six communities – Aewoe, Gheoghoma, Wolotolo, Wuliwutik and Wanda – make yearly budgets. These vary in quality; the three best ones, in Woliwolo, Wuliwutik and Wanda, cover all paid out costs, but do not yet include imputed costs, for example of villagers using their own transport, telephone, equipment and housing when maintaining and managing the water supply.

- *How transparent are accounts?* Some 40% of the local water management organisations keep proper accounts. In Arus, Dhawo, Wolomako, Aewoe, Nirangkliung, Wolowiro, Koliwutun and Lewohala, local water management bodies keep accounts, but do not do this very well. Thirteen others have water supply accounts which the committees are

keeping well, but only seven of these ─ Compang, Inelika, Wolotoko, Wuliwutik, Hokor and Balaweling II ─ use an accounting system that is understandable for outsiders. None of villages has an accounting system that is understandable for the common women and men in the community.

Figure 5 Productive use of domestic water

Actual payment and degree of coverage of running costs are significantly associated with financial transparency and accountability (Table 8). Improving financial management skills in combination with accounting for service management to women and men heads of user households is thus an important factor in achieving better financial sustainability of local water supplies.

Table 8 Correlations between quality and transparency of accounts, payments and cost-recovery

Indicators	FIN2 - Degree of coverage water service costs	FIN7 - Actual payments service costs	FIN6 - Equity in payment system service costs	FIN5 - Quality & transparency accounts	CM7 – Reporting of performance to users
FIN2 - Degree of coverage water service costs	1.000	.681**	.617**	.674**	.595**
N	51	50	50	50	46
FIN7 – Actual payments service costs	.681**	1.000	.680**	.681**	.626**
N	50	51	51	51	46
FIN6 - Equity in payment system service costs	.617**	.680**	1.000	.730**	.652**
N	50	51	51	51	46
FIN5 - Quality & transparency accounts	.674**	.681**	.730**	1.000	.854**
N	50	51	51	51	46
CM7 – Reporting of performance to users	.595**	.626**	.652**	.854**	1.000
N	46	46	46	46	46

** Correlation is significant at the .01 level (2-tailed).

In summary, the emerging picture is of communities which have been required and willing to contribute substantially to the capital costs of construction, but have not yet all come to

appreciate and arrange for good planning and financial management to cover the recurrent costs.

Such lack of investment in maintenance typically appears later when more substantial emergency repairs emerge or the system starts falling into disrepair. However, at the time of emerging demands, the support projects have usually finished and with them the backstopping and training that can help develop suitable managerial capacities. The Water Forum (Forum Air Bajawa, Box 10) is an example of such backstopping which might be expanded to include financial management. At present, wherever individual villages have arranged for better (though nowhere optimal) accounting and transparency, financial performance is already significantly better, but there is no structural backstopping

Box 10 A district level organisation for village backstopping in Ngada

Formed in each district following the completion of FLOWS projects , water fora were intended to provide technical assistance for the maintenance of facilities installed in the participating FLOWS communities. *Forum Air* (Water Forum) in Ngada district is the only one that remains to actively assist communities with the maintenance, repair, and expansion or upgrading of water facilities. The forum is a legal organization endorsed by the local government in Ngada District. Its full name is *Yayasan Badan Pengelola Sarana Air Bersih dan Sanitasi Pedesaan* (YBPSABSP). It provides materials and technical assistance for repair of the water supplies and the extension and/or upgrading of their distribution nets.

Forum Air Bajawa has an initial capital for its activities, mainly derived from accumulating unused project materials in each community, such as pipes (PVC and GI) and other accessories. It has a secretariat in an office that also functions as a safe storage place for the materials.

Active forum participants are former community facilitators in the past FLOWS villages. The forum is currently headed by Bapak Paskalis Losa, with the assistance of several others, including Ibu Veronika Moi, who is an experienced female technical facilitator.

Former FLOWS communities have maintained a steady relationship with this forum. Sustainability of water facilities in communities is more ensured since residents now have a window or place to consult about the maintenance and upgrade of their facilities.

Source: Field report

4.3. Water use, hygiene and sanitation

4.3.1 *Access and use of the improved water supply*

On the social maps, the local women and men marked the cutting-off zones beyond which village households have no easy access to the improved water supply, either because there are no or too few taps, or because the water rarely reaches the locations. On average, the access to an improved water supply for at least drinking water was good: 85%. This is above the 80% that epidemiologists such as the late Dr. Esrey in UNICEF recommend as one of a set of indicators of a critical mass for a reduction of faecal oral diseases. (The other and more important conditions are having and using enough water for hygiene and safe excreta disposal; these are discussed in the next sections)[9]. Five years after installation (the average system's age), 40% of the sample villages still had access for all to the improved water supply (100% score based on the social map).

In the social maps, houses of families locally classified as better-off, poor, or in-between have a different colour or shape. This makes it possible to count how many of those with and without access fall within each category and to compare between projects and districts.

[9] Esrey, S.A. (1994). Complementary strategies for decreasing diarrhea morbidity and mortality: water and sanitation. Paper presented at the Pan American Health Organization, March 2-3.

Fig. 6 shows that in general, the improved services benefit especially households which the villagers themselves classify as poor and middle class. Only in Manggarai and to a lesser degree Flores Timur the villages in the sample have relatively low percentages of poor people with access. The differences between project agencies or districts are not significant, however, indicating that they are not associated with a differences in project approach or regions.

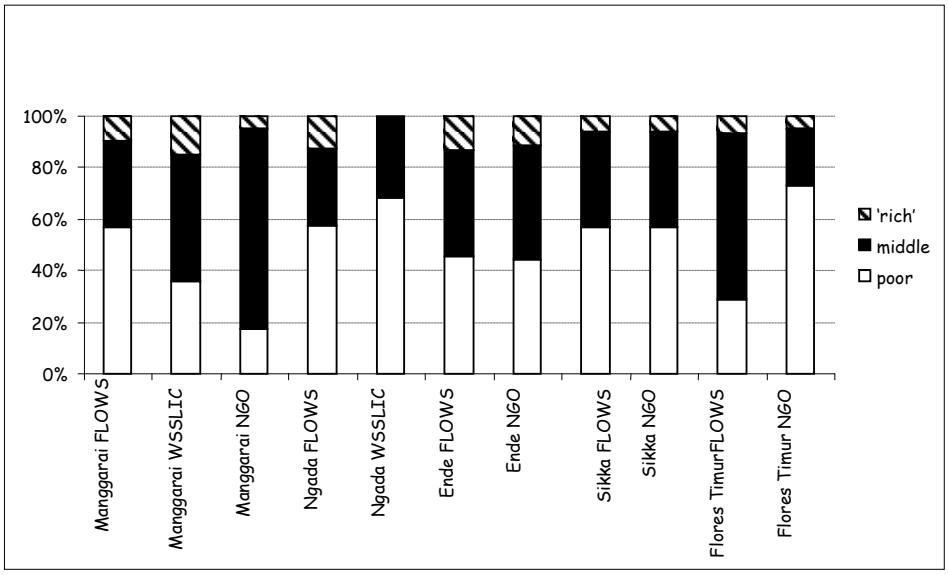


Figure 6 Proportion of access to improved water supply by class

Although average access is high, there are significant exceptions for individual communities. In the communities in Table 9, for example, less than half of the population has easy access. However, only in Compang have the poor been systematically disadvantaged. In one village, Ojang, the local statistics of counting houses and beans even shows that the group with access is exactly proportional to the proportions of these groups in the overall community, without under-or over-representation of any group.

Table 9 Distribution of access by socio-economic class in villages with lowest access scores

Village	% of households in village belonging to			% of households with access belonging to		
	Better off	Middle class	Poor	Better off	Middle class	Poor
Compang	10	26	64	15	45	40
Gera	4	36	60	3	31	67
Nirangkliun	1	36	63*	1	32	67
Ojang	16	59	25	16	59	25
Lewolaga	8	61	31	4	64	32

* Poor and very poor combined

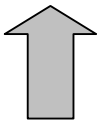
Opportunity for further analysis
It is possible to triangulate this information from the social maps in a more detailed study. This can be done by comparing the social map scores with the scores for indicator BC2, *Adequacy of water for poor households*, which poor women and men themselves scored during the focus group discussions. Not known is whether, and to what extent, the percentage of access has either decreased or increased from the original coverage. Information is available on which villages have carried out further work or projects for their water supply, so perhaps a detailed analysis can show up any trends. However, as the communities did not prepare social maps with the access to water supplies and improved toilets for better off, poor and middle class households at the start of their projects and immediately thereafter, it is presently not possible or feasible to trace the detailed coverage history over time.

4.3.2 *Water use patterns for improved water supplies*

The limited amounts of water supplied from the improved systems which was reported in Section 4.2 above has important consequences for the contribution of the projects to hygiene, health and household productivity. This is illustrated further in Table 10.

Table 10 Purposes for which water from the improved supplies is used, by percentage of villages and district

District	Drinking and cooking	Drinking, cooking and some hygiene	Drinking, cooking and all hygiene	All three uses plus domestic production	Total %
Manggarai	40	10	30	20	100
Ngada	27	0	36	36	100
Ende	10	0	40	50	100
Sikka	36	9	27	27	100
Flores Timur	29	7	32	33	100



Point of return for public health benefits

The table shows that in a substantial proportion of the villages, in Manggarai even half, the improved water supply is used only for cooking, drinking and occasionally some hygiene. For other purposes, the households must use other water sources. Since the piped water systems are usually the supplies that are closest to people's homes (most villages use springs or streams as alternative sources), this means that women and girls must either walk farther for clothes washing and bathing, or carry the water home if their privacy and safety are not sufficiently guaranteed.

Moreover, the amount of water which they can thus collect for hygiene will be lower than when they can use a nearby tap for water collection and wash and bath their children and themselves at private and environmentally safe locations nearby. Research has shown that it is especially the amount of water used for personal hygiene, and not so much the drinking of safe water, which reduces the incidence of diarrhoeas and, in dry areas, of skin and eye infections. Many families also use domestic water productively within the household, e.g., for animal raising and vegetable growing (women) and building and cattle (men).

Restrictions on the amount of water used for hygiene and livelihood are therefore contrary to the intended health and developmental benefits of improved domestic water supply systems. The ban on washing and bathing at water points which the project rules have imposed (see below) have furthermore clearly not have led to a reduction in stagnant water around the water points, a purpose for which they probably have been made.

4.3.3 *Hygiene knowledge and behavioural change*

To evaluate local health and hygiene knowledge and perceptions on the need and feasibility of behavioural improvements, a three-pile sorting exercise was done with women and men in better and worse off sections. The results showed that basic hygiene knowledge in Flores is quite good. The priority risky practices which people identified were open defecation, using the river for drinking water, and unsafe water drawing from

storage vessels. It requires cross-checking with the local health statistics, but these practices probably correctly reflect the major health risks in the island.

No significant differences were found in the views of women and men and poor and non-poor on what constitute good and bad hygiene practices.

Two major insights emerged:

- The practice "cebok anak di KU" (washing children at the public tap) was classified as a bad practice. This is actually a *good* practice, especially in dry areas. It prevents skin infections and eye infections which can cause blindness. The project-imposed rule of washing and bathing at the taps thus forbids behaviour that in principle is healthy and reduces the work of women and girls. And as seen above, it has failed to prevent the problem of poor drainage which was probably the real reason for imposing the ban.

- Washing hands is not getting a high priority. Women and men generally did not list it among their first five priorities and considered hand washing habits easy to change. The main objections came from poorer men who said that as they work in the field it was hard for them to wash hands and keep them clean.

4.3.4 *Safe disposal of human excreta*

All project agencies included the improvement of toilet facilities in their design approach. The strategies used were oversimplistic. FLOWS and WSSLIC provided the materials for a number of demonstration latrines, for distribution to individual households (FLOWS), or combined with installation in public institutions (WSSLIC). The NGOs provided materials for self-construction to the households at large. Table 11 gives an overview of the supply as recalled by local women and men. If toilets were included in the supply, they were of the water-sealed type only; the village women and men had no informed choice in the matter. In dry areas, women could for example not opt for dry latrines which would have required no extra water collection.

Table 10 Sanitation inputs from project agencies as known to women and men in 19 villages

Village	Sanitation input	Agency
Beawaek I (Tado)	'closet'	FLOWS
Coal	'closet'	FLOWS
Mibuit	'latrine package'	FLOWS
Pedha	15 latrine packages	FLOWS
Wolomako	15 latrine packages, 8 porcelain, 7 plastic toilets	FLOWS
Aewoe	15 latrine packages	FLOWS
Wolomere	2 WCs in elementary and junior highschool, 1 WC in the church, village office, primary health centre and the chief's house	WSSLIC
Detupera	1 closet, 2 bags of cement, 3 iron bars, 3 iron sheets	FLOWS
Wolotoko	13 plastic closets, 7 cement closets	FLOWS
Tautimur	40 toilets, 1 bag of cement, 1 iron bar, iron sheets	NGO
Gera	45 latrine packages	FLOWS
Ipir	'wc'	FLOWS
Hepang	'wc'	FLOWS
Wololele	4 wc's	FLOWS
Ojang	107 bags of cement	NGO
Wallolong	25 closets, 40 bags of cement	FLOWS
Lewohala	'wc'	FLOWS
Kawalelo	'wc'	FLOWS

FLOWS and WSSLIC generally left it to the village leaders to decide what would happen with the packages for demonstration latrines. As a result, there are many villages where the

common village women and men either never came to know about the latrine supply or did not know what had happened, while leaders were reluctant to explain what had happened.

The material of the toilets themselves (locally also known as 'kloset') might be porcelain, plastic or cement. It was not clear to the population which criteria guided the projects' decisions on the numbers and the kind(s) of toilets which they provided to the villages.

Figure 7 gives an overview of the percentages of access to improved sanitation (in terms of improved types of toilets) in the project villages by district and agency. Household ownership of improved toilets averaged 54%, with a range from 6% (one village) to 100% The latter situation, in three villages, has reportedly resulted from a GoI program that provided every household in selected villages with free toilets.

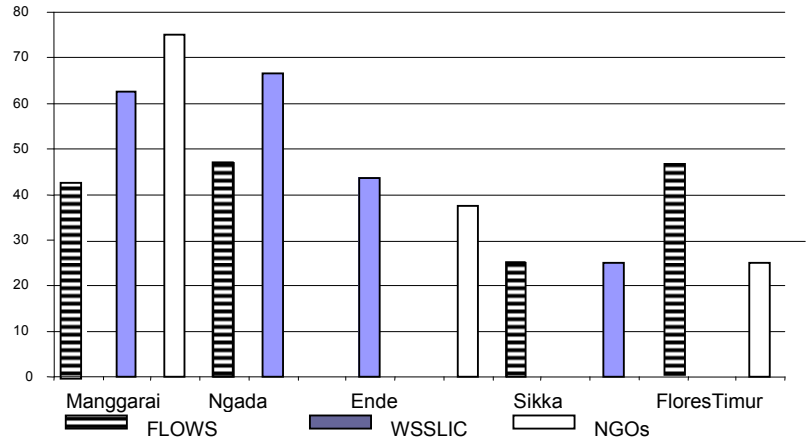


Figure 7 Latrine access by district and project support agency

The above situation cannot be ascribed to the projects alone, as many households have installed latrines with their own resources. Overall, 2982 households in 47 villages have privately installed improved types of latrines, an average of 63 per village. Between villages, the achieved rates of installation differ considerably. In ten villages (Beawaek2, Compang, Arus, Wugawuga, Wolomere, Lewolaga, Wailolog, Watutu, Riangkeri and Mokantarak), more than one hundred households have done so, in Ipir and Leokluol even over 200.

The demonstration latrines may have played some role in promoting improved methods of excreta disposal. A large impact is unlikely, however, as in most villages local women and men were not, or only very vaguely, aware of who got the packages and what happened with them. Apparently, the leaders who received latrines 'for demonstration' have not widely shared this information nor encouraged visits to these latrines as 'demonstration models' after their installation.

Fig. 8 gives the ownership of private per district and support agency. It shows that the households who have installed latrines belong predominantly to the middle-class and the better-off.. However, only a comparison with the percentages of households over the three groups in each village can show whether there is an overrepresentation of the higher strata in the private installation of latrines.

Although there are considerable differences between districts, these are mainly related to the above mentioned differences of latrine ownership in the individual villages. There was no significant relationship with either the type of agency, the general ecology, or the local (community) water supply conditions. The former is not surprising, as the approach of the two major support agencies, FLOWS and WSSIC, was basically the same. The latter shows that households install improved toilets *also* when water supply conditions in

villages are less favourable. Whether the individual households tend to live relatively close to a water source can only be analysed in a more detailed study of the data.

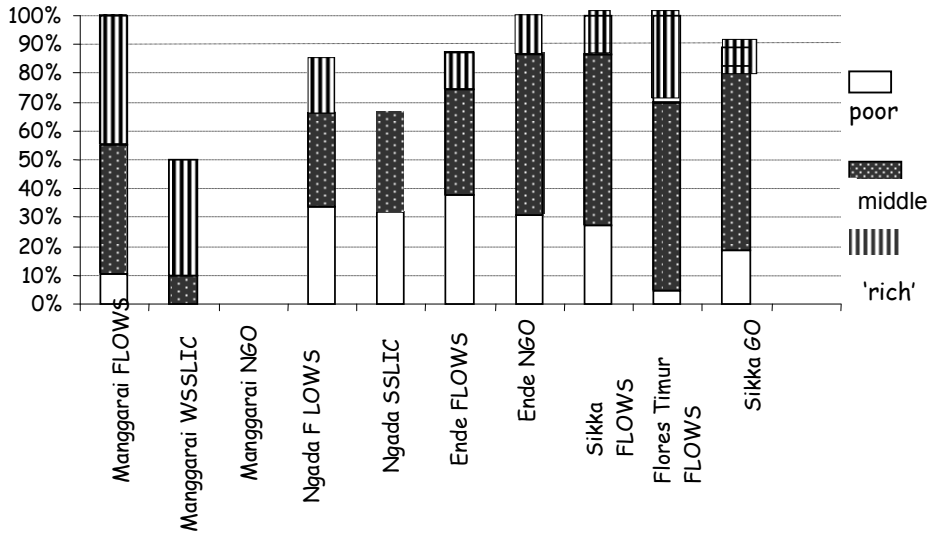


Figure 8 Private latrine ownership in project villages by class, district and support agency

Are latrines that have been installed also used? Focus group meetings with pocket voting on latrine use habits of the different household members gave as result that *total* non-use is rare. However, so is *consistent* use. The average scores for the different groups indicate that only one quarter of the different users always use latrines for excreta disposal. When households have private latrines, many adult men, women and children at times also use the open space. Where one may expect that gender restrictions play a role, differences between the sexes and age groups are small and not significant. Adult and adolescent women and men and old women and men had virtually the same patterns of latrine use. Only two age-related behavioural patterns emerged:

- In more isolated villages, *old* women and men use toilets significantly less often than in less isolated villages;

- In twenty percent of the villages, caretakers of young children do not safely deposit the faeces of babies and infants. They are mostly the mothers, but possibly also siblings and grandparents; this was not assessed. In only one village did the focus groups agree that safe disposal of infant's excreta was commonly practiced.

Opportunities for further analysis
A more detailed investigation of the sanitation data can show whether the privately installed latrines are also predominantly of the pour-flush type, or whether households have also opted for dry improved latrines, in partticularly in the drier areas. In-depth analysis can further give insights in the quality of designs, installation, use (including for other purposes than intended), technical and hygiene maintenance, the distances for water collection for the different types of designs installed, and provisions for handwashing. It is also possible to analyse whether in the project villages proprotionally more households from the middle and higher classes have installed latrines than poor households.

4.4. Institutional aspects and their gender and social equity

4.4.1 *People's participation in planning decisions*

Through pocket voting, with different colour tabs for sex-disaggregated statistics, focus groups of poor and better off women and men recalled who has participated in the different planning decisions for the water supply and sanitation project. The results show that decisions which involve the whole community, men as well as women, have occurred mostly to form the management organization and make decisions on financing (Table 12).

Decisions on project initiation, technology and service level have far less often been democratic. Even decisions on the location of the facilities have often been made by the project, male leaders, or a male village meeting. Where such decisions have been made with all users, significant but low correlations existed with the quality of the water service in terms of water quantity, quality and reliability.

Table 11 Participation of women and men villagers in planning decisions

Village women and men participated in decisions on:	No. of villages	N	%
Project initiation	4	58	7
Choice of technologies	3	58	5
Levels of service	6	58	10
Location of facilities	15	57	26
Composition of local management organisation	23	54	43
Arrangements for operation and maintenance	10	53	19
Arrangements for local finaincing	25	52	48

From earlier research[10] and from this study (see Section 4.5) it has emerged that a wide and informed participation of women and men in local planning decisions contribute significantly to better sustained water services. Box 11 shows that in this area, considerable progress can still be made.

Box 11 Participation in planning decisions - areas for improvement

Even though the top-ten communities do better than the others on post-construction maintenance, management and financing, their participation in the initial, informed decision making stage could have been better. To start with, village heads were usually the only ones to receive information about forthcoming projects from the external agency. Further, fundamental decisions on services, selecting the type and level of services – were made by village heads (mostly elite men) in collaboration with the external support staff. In eight out of the top ten communities the only decisions that involved the entire community (the general "*masyarakat")* were choosing sites for the new water facilities, and the amount and type of payment required of users. Nevertheless, in these communities at least some *(*albeit few) areas of decisions were opened up for the whole community to decide, whereas this happened only in two out of the bottom ten communities. In the other eight worst performing villages, the outside agencies played the key role in decision making, in collaboration with village heads and a few male elites. Both women and men of the poorer classes, being the least empowered, had virtually no voice and choice.

4.4.2 *Local water management*

In preserving the continuity and good results of improved village water supplies, sanitation and hygiene programmes, well-sustained village institutions with sufficient management

[10] See Gross et al. op cit., van Wijk, op. cit. , and Narayan, Deepa (1995). The contribution of people's participation: Evidence from 121 rural water supply projects. (Environmentally sustainable development occasional paper series No. 1). Washington, DC: World Bank.

authority and capabilities play a crucial role. All but one of 52 project communities had initially established a special committee for the village water supply project (typically a project requirement); 42% of these had a woman or women members (Table 12). Three to eight years after completion, committees were still active in 31% of the villages. In 53% they are dormant and in 6% defunct. Box 12 gives an example of active management in one of the top-ten villages.

Box 12 Strong management as a condition for a sustained service

Desa Aewoe is a village right on the Kecamatan road. This is a single village scheme, with 35 public taps spread throughout the village. Most of the public taps, serve 5 households, although there is one public tap that serves around 14 households. With this arrangement, most of the households in this village are already close to having house connections, as they just need to transfer water from the public tap to their house using plastic hoses. And as there are only 5 households served by one public tap (with two taps), they can easily get water right to the house. This village still has an active water committee, and is a member of the Kabupaten Ngada Water Committee Forum reported in Box 10. It has third place on the list of best sustained water supplies (score 366/400). Every public tap is managed by a nominated person; all of them are female. They collect fees, and disconnect those who do not pay.
Source: Supervisor's report

Of the sixteen active committees, twelve are formal, that is, they are sub-committees under the official village administrative structure. The other four are informal committees. They are the former public tap committees which have taken over general operations when the community-level committees became defunct. As discussed in more detail under gender in the next section, half of these active committees have women members (Table 13)

Table 12 Composition of local water management organisations

Composition of local water management organisations	At handover		At evaluation	
	N	%	N	%
All (100%) male	28	58	8	50
75% - 90% male	15	31	6	38
More than 50%, but less than 75% male	4	8		
Gender balanced (50%)	1	2	2	13
Women overrepresented (67%)	1	2	-	
Total	49	101	16	101

Newly established water committees are not the only type of organisation or group concerned with water supply, sanitation and hygiene in Flores. Through Venn diagrams, local women and men identified on average some 30 agencies outside their village and 29 organisations, groups and persons inside their village which play a role in water supply, sanitation and hygiene.

There was no difference between the number of organizations identified by groups of better off and less well off villagers, and women knew almost as many both inside and outside the village as men (16 and 14 for women and 16.7 and 15.7 for men). The groups also specified how close the different organisations were to them. Further analysis could give valuable insight on which institutions the four groups have actually listed, in which institutions they place the greatest trust and what the relative position of the newly established water committees is among them.

Throughout Flores, the gender balance in the composition of village water management organizations and in local decision making on water management has remained low.

Using mini-scenarios as summarized in Table 14, given initially without the scores (which are in steps of 25, so that in-between scoring is possible), the local water management committees have rated themselves on ordinal scales for these two aspects. In mixed committees, a female facilitator would seek the experiences of the women members separately as they might not be able to expresss themselves freely otherwise. Management decision making scores have also been validated in the focus group meetings with poor and better off women and men.

Table 13 Measuring gender equity in management

Scenarios in local water management organization	Scenarios in management decision-making	Score
No special water management organisation; service operation is dealt with by agency and general local leaders	No women in community-level water management organization at all, or only in name	0
All male water and sanitation committee representing middle and higher class users	Women are members of community-level water management organization, but do not regularly attend meetings	25
All male water and sanitation committee representing low, middle and higher class users	Women are members of water management organization and do attend meetings but do not participate in decision making	50
Special water and sanitation management committee with up to 50% women and representing middle and higher class users	Women are members of water management organizations, attend meetings and can influence decisions	75
Special water and sanitation management committee with up to 50% women and representing low, middle and higher class user households	Women and men both participate in decision-making on water management at meetings both within and outside the community	100

As already shown in Table 13 above, most of the local water management organizations have been and are exclusively composed of men; in the others, men form the majority. Only one village had a balanced water management organization at the time of handover, while in Hepang, four women and two men formed the management committee.

In the table, this has been placed under overrepresentation, since from other programmes it is known that tendencies exist to make water management the exclusive responsibility of women, with the men pulling out of their responsibilities. Community water projects then risk to become 'women's projects' instead of community projects with equitable contributions from and benefits for all.

At the same time, the data also reveal that the villages which have active committees today have a better gender balance. Chi-square testing shows that the differences are statistically significant.

Having women on water management committees does not imply that they will share in making decisions. Table 15 shows that only in six percent of the villages women have the experience that both sexes are attending the meetings and that decisions in these meetings are taken jointly. More attention to gender and social equity during project processes is thus essential (Box 13), especially in view of the differences in impact on sustainability, as will be reported below.

Table 14 Gender and water management decision-making

Management decision making In village decisions on water mngt	N	%
Only men meet for mngt	32	65
Women attend, but not regularly	6	12
Women attend, but do not take part in decision-making	2	4
Women attend and take part in decisions	6	12
Women and men both participate and take decisions jointly	3	6
Total	49	99

Triangulation between the findings in the above tables confirm the experiences that mixed membership is easier to attain than full decision-making. Nevertheless, villages with active committees have more women in water management .

Box 13 Gender and social equity in water management decision-making

In five out of the top ten villages – i.e. those with the highest scores for sustaining their water supply – men and women of all classes ('rich', intermediate and poor) were recorded as having been involved in choosing their *BPSAB*s, or water and sanitation management committees. In all cases, the composition of the BPs had reportedly been decided by the *masyaraka* (community) in some form of public meeting, therefore implying that its members were democratically chosen. However, it can be noticed that the BP is mostly comprised of men. If women were involved during the selection of the committee, they did not seem to have influenced the selection of an equal or proportionate number of women representatives in the final BP. In BPs that have been formed with one or more women members (rich and poor), even in the top-ten villages, they are present during meetings and sometimes voice opinions, but are rarely involved in the final decision making process. 4 out of top 10 BP's, and 3 out of the bottom 10 BPs, were continuations of BPSABS put in place before the new system – and the elitist composition of the older committee was not changed. In the bottom ten villages, of the five villages that do have BP's , three include women from the middle and upper classes – leaving the voice of the poor women still unheard. In the top-ten communities, only 1 village had no woman in community level water management organisation at all, or only in name. In the bottom-ten, the corresponding number of villages was two.

The bottom-ten communities show very low scores for community organisation and management. In nine communities, there isn't any form of management organization functioning (no structured *badan pengelolaan*). Whereas the top-ten villages all retain a set of rules on the water supply , some or all of which are followed by all sections of the community, 50% of the bottom-ten villages had no established rules in place. In the absence of rules and an organisational body to implement them, there is risk of neglect and a consequent risk of mismanagement of the system. (see also Box X). Meetings regarding the management and sustainability of the water service are *never* held in *any* of the bottom-ten communities. In the top ten, 4 communities hold meetings as frequently as necessary, where all members actively participate in effective decision making. Another 5 hold meetings occasionally, where decision making occurs with varying degrees of efficiency.

Source: Top ten and bottom ten communities analysis

Although the number of cases with more equitable forms of management is small, it has, nevertheless, already led to interesting and statistically significant differences:

- The presence of more equitable water management organizations was significantly correlated with a more equitable access to information and training, and greater participation in and use of training, more timely repairs, better payment, better coverage of operation and maintenance costs and a better performance of the water supply in terms of regularity and water quality (though not year round) and water more often used for hygiene and household production;

- Where in local management women and men shared management decision-making more equitably, committees met more regularly, the level of repairs done in the community was higher, the payment system was somewhat more equitable, and scores for actual payment and transparency of accounts were slightly better. There was also a significantly more regular water supply which was more adequate in the rainy but especially the dry season and water was more often used also for hygiene and household production;

- Committees that met more regularly tended to have a somewhat better gender equity, had more often set rules, had more transparent accounts and were relatively more accountable for the service to the users, did better on payment and had a more adequate water supply in the dry season.

There is thus statistically supported evidence from this study that gender and social equity in project processes pays off in project results.

Further opportunities for data analysis
External project agencies often require that villages establish new committees for the management of new projects. The Venn diagram analysis showed that in general, there are already many institutions involved in improving water supply, sanitation and hygiene. These institutions are of varying importance and distant from women and men in better off and worse off households. A more detailed analysis of the institutional data may give valuable insights into how realistic it is to create new institutions in villages where already many are active, and whether there are alternative options for informed choices within the villages in Flores. The analysis might furthermore identify why the current water committees did not continue their work and what roles gender relations play in the continuity and performance of local water management. If the data permits, it may also be interesting to identify common membership among key committees and groups, as anecdotal reports indicate that the same members appear on multiple committees, especially those required to be formed for external assistance projects.

4.4.3 *Training for enhanced capacities*

Although capacities for better managing water supplies, sanitation and hygiene are built in more ways than through the provision of training, training remains an important means for villagers to expand their knowledge and proficiency in managing their water supply, sanitation and hygiene.

Access to such training was inequitable. As far as villagers could recall, the project agencies trained 532 people. Eighty one percent of them were men. Gender misbalance was highest in technical and management aspects (93% and 89% men, 7% and 11% women). Women had a slightly greater chance to get training in financing aspects: of those known to have been trained 82% had been men and 18% women. The balance was relatively best for training in health and hygiene: 34% women, 64% men.

On social equity, the scores for training were somewhat better. In 58% of the villages, those trained came mainly from households in the middle and low welfare groups, while in 25% predominantly members of upper class households had received training. Whether those trained lived in relatively poorer or richer villages made no difference for the men. Chances for *women* to get training were significantly higher in the socio-economically better-off villages (r=.47**). Information on training opportunities was however seldom widely spread. Most common was that only a small group of people had been informed. Freedom to opt for training had existed in only eight villages (12%) and in only one village (Wuliwutik) could people recall special efforts to make it easier for women and poor people to go for training.

There is considerable scope to improve the effectiveness of the training. Asked to choose the scenario that best described the use of the training, only 14% choose scenarios of use by most or all of those trained. This may, however, also be due to problems of recalling who had gone for training, especially in villages where information on and participation in training was limited to a small group.

Widening information about and equitable access to training is one way to increase training effectiveness: in villages with more widespread information on training, more

women and poor people had taken part (r=.64** and .71**) and training was more often reported to be used in cases where a better gender balance and social equity had been present (r=.59** and .54*).

4.4.4 *Satisfaction of users' demands*

In the four focus groups, women and men from relatively better-off and poor households separately listed and valued the water supply, including its current performance, for the extend to which the supply meets their requirements. As illustrated in Fig 9, the scores of satisfaction are generally high, although, as also found in the individual village group scores, there are no cases where all demands of all groups are met.

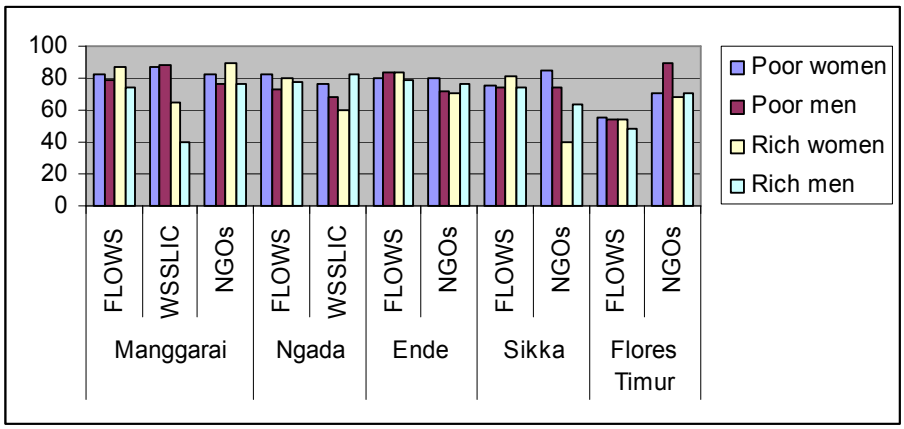


Figure 9 User satisfaction of poor and better off women and men

Community managed water supply services can meet many demands as experienced by the users: more water for various uses, less time and efforts for collection, more time for other activities, including education, leisure and sleep, improved hygiene and health, more control over local services and their management, etc. All these aspects may influence the overall scores of the various groups. Apart from this wide range of benefits – recorded and available for later content analysis, but see also Box 12 – special attention was paid to the adequacy of water for poor households. The results are presented in Figure 10. Here, the projects clearly performed less well than for overall demands. Seen the problems reported with technical designs and performance, available water amounts and reliability of services, this is hardly surprising.

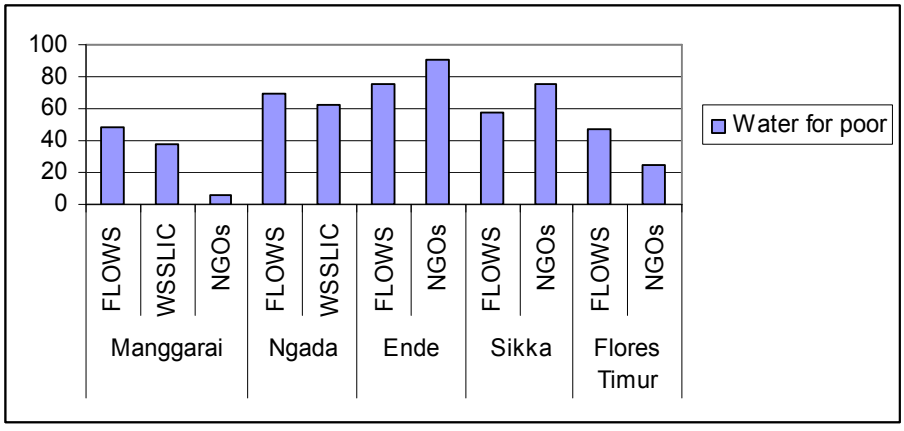


Figure 10 Adequacy of water for poor households

However, the *individual* village data (not given here) show that these problems are not related to the implementers, but occur across villages, irrespective of which agency has

supported the projects. Instead, the distinguishing factors are the quality of design and construction – especially the system design, quality of materials and the quality of the distribution net – which make the significant difference. The degree of democratic participation, which was significantly higher in many of these villages has *not* made a difference, as it was on the managerial aspects, and not on the technical aspects.

Box 14 ***Better sustained services benefit rich and poor- but not in all cases***

In the top-ten communities benefit scores of the poor men and women were consistently higher than the scores of rich men/women. They were also consistently higher than the scores in the bottom-ten villages except for the three villages where the poor do not get enough water (Wuliwutik, Aewoe and Baleweling). However, in the villages with the highest levels of sustainability, the poor suffered lack of water for a short period of the dry season , whereas in communities with low sustainability, the poor were inconvenienced with lack of water for most part of the dry season.
In all communities, the groups agreed that benefits of having the water supply facility far exceed the initial implementation costs. In all social classes (R/P, M/W) more benefits than costs were recognised and these benefits seem universal. Benefits - according to the rich groups- of having the water supply facility include cleaner water for cooking and drinking, washing, water for bath/wc, water available for gardens, building better houses The main benefits to the poor are the saving of time due to proximity and the availability of water during all seasons. The costs are recognised as being occasional, and include minor water logging around the facility and slight repairs.
Source: Top ten, bottom ten analysis

4.4.5 *Equity in contributions and benefits*

It was already seen that although women and the poor benefit from improved facilities and new opportunities to influence local designs, management and control, they do not do so to the same extent as men and the better-off. This has happened despite the fact that in three quarters of the villages, everyone – women and men alike – have contributed to the contruction in kind as well as in cash.

Contributions in cash and kind have generally been the same for all (Table 16) . Neither project nor villages (except for one or two) have taken into account the considerable differences in economic standing and service levels, such as distances to water points and access to private taps.

According to the groups' own scoring, in half of the village projects, the households' contributions in kind - labour for digging, transport and cooking, local construction materials and food - were felt to be equitably shared within the family. However, in the other half of the communities, especially women, or poor families, tended to do the voluntary work (19% and 12% respectively).

Table 15 Equity in contributions to construction

	Supporting project	None	Voluntary and free	Voluntary by all	All, flat	All, according to capacity	TOTAL
Contribution in cash	FLOWS	13	2	3	29	2	49
	WSSLIC	0	0	0	6	0	6
	NGO	1	0	0	3	1	5
	TOTAL	14	2	3	38	3	60
Contribution in kind	FLOWS	0	6	12	28	1	47
	WSSLIC	0	1	1	4	0	6
	NGO	0	0	2	2	1	5
	TOTAL	0	7	15	34	2	58

In the operations phase, the division is similar. In 48% of the villages, low and high status work associated with water supply and sanitation is done regardless of sex and class. In the other half, the tendency is that gender and economic factors make that the higher status work is done by men or, if done by women, it goes to women of the elite. Equitably sharing of paid and unpaid work happens however in far fewer villages (23%) and is closely related to the way projects and communities handle these issues (Box 15).

Interesting findings are here that the division of work is more equitable in the eastern than in the western districts, and that in communities where work is shared more equitably, the poor also consider having a better share of the water.

Box 15 Gender divisions in operation and maintenance – what roles do projects play?

In the top and bottom ten, the division of work and power is shared equitably in 5 and 6 villages, respectively. Thus, in these villages high and low status work in water and sanitation is equitably shared between women and men of all socio economic levels. In the remaining cases, (both top and bottom ten) mostly the men are responsible for technical work that falls under the category of "skilled labour" – such as technical repair, maintenance, fitting of new pipes. This form of labour is usually paid. (The project provided only men with technical training) In contrast, women are only involved in unskilled labour such as cleaning jobs – and are usually unpaid volunteers. Skilled jobs extended to women are limited – the main example being the treasurer in the BP. And even then, there is no guarantee that the woman in that position receives financial training for her task. The BPSAB members are not paid for their work either.

5. Factors which Contribute to Overall Sustainability and Use

5.1. Significant positive relationships between approaches and results

The underlying assumptions of the MPA are that improved water supplies and improved sanitation (toilets, drainage) will be better sustained and used when:

- *The external projects respond to local demands in a demand-responsive manner*. Indicators of the presence of a local demand include the willingness of the households to contribute, in cash and/or kind, to the new system/sanitation facilities and their translation of this willingness into actual action. Indicators of a demand-responsive approach are the extent of voice and choice which the project agency gives to the different groups in the communities during the local planning process. The greater the number of local planning decisions on which the community can make its own well-reasoned choices and the more democratic this process, the better it is expected that the different user groups will sustain and use the new facilities.
- *The established facilities and service continue to meet the demands of the different user groups*. The indicators for a continuing satisfaction of demand is that the different user groups (women and men from better and worse off groups) rate the benefits of the facilities higher than their (social and financial) costs.
- *There is equitable empowerment and an equitable division of burdens and benefits during the establishment and operation of the water supply and the sanitation facilities.* With empowerment is meant in this case that the community has the authority and capacities to properly maintain, manage and finance the improved water supply and run its own local domestic sanitation and hygiene programme. Equity refers to gender and social equity. It is expected that when the water supply is not dominated by one specific group, but there is balance in power between the various interest groups, especially for women, with their direct personal interest in good water supply and environmental sanitation conditions, the management of the water supply and sanitation program will on average be fairer and more effective.

The findings in Flores go a considerable way to support these assumptions. They are presented in the correlations diagram in Figure 12.

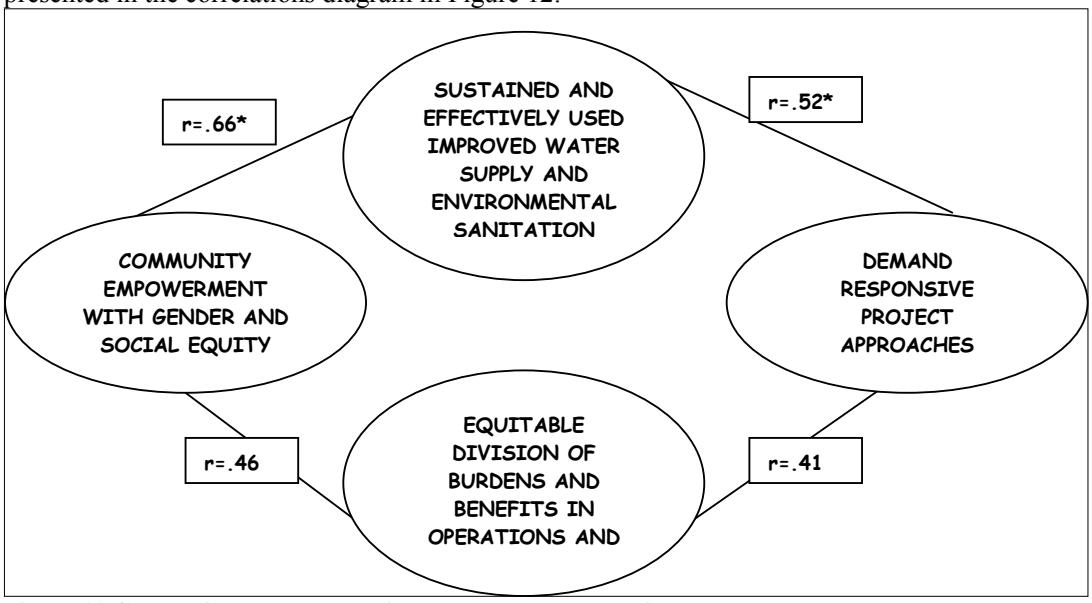


Figure 11 Correlations between project approaches and project

Separating sustainability and use
Sustainability and effective use have been combined in the above figure, because the technical observations on the water supplies that are included in the equation contained aspects related to sustainability and aspects related to effective use (e.g., the avoidance of stagnant water around public taps). It is, however, very well possible to separate these two aspects in a more detailed study and rerun the correlations for A and B separately.[11] During such a more detailed study, the detailed scores of the latrine evaluations made with the help of the 'latrine self-scoring sheets' could then also be included. In the present analysis and reporting, this more detailed analysis of latrine construction, maintenance, use and gender and personal hygiene aspects is not included.

The findings confirm earlier findings in the global study (Gross et al., 2001), but show stronger relationships. There is a direct and significantly positive relationship between a demand responsive project approach in the planning, implementation and operations stages and the results in terms of sustainability and effective use. The relationship is even stronger with community empowerment with an equity perspective.

The relationship with equity in division of burdens and benefits goes via these other clusters. In other words: if burdens and benefits are more equitably divided then the projects are also more demand responsive and system management is better and more equitable. A detailed analysis of what these benefits and burdens constitute in the different villages and whether and how they differ for women and men and worse and better of groups remains to be made.

Box 16 The value of good governance: avoiding free for all situations

In *Wololele*, there is no management committee for the system. The *stopkran* valve was put in place in order to control and monitor the water pressure in all public taps. It was not protected by any commonly agreed rules or a caretaker. As a result, anyone could control the *stopkran* to increase or decrease the water pressure, and to open or close the water supply to any one of the public taps. Several social conflicts have occurred within members of the community on this account. Therefore, even though the system is functioning , the lack of good governance is limiting the people's ability to enjoy the full benefits of the system – and has lowered the community's benefit scores
Source: Top and bottom ten analysis

5.2. The role of agency factors

No significant correlations were found between the project approaches and results on the ground on the one hand and the agencies' policies and institutional arrangements as assessed in the meetings with implementing staff and policy makers. This finding is not surprising as the scores for the institutional aspects at agency level hardly varied. In Section 2.2.5, the reasons for this outcome have already been indicated

First, almost all village projects in the sample have been implemented by the same governmental structure, with the same staffing, training and institutional rules and procedures. Secondly, there was no fully independent scoring during the stakeholder meetings. With hindsight, stricter privacy should have been observed, for example through the use of pocket voting and other 'secret ballot' techniques. Even then, it can be doubted whether the results would have been much different. As the general conditions and

[11] The results of an earlier test were presented at a review meeting on the work in progress. These were made without including the detailed technical scores resulted in significant, but lower differences for sustainability and use. This significance for the two separate clusters got lost when the technical scores (which included scores on use) were added to the equation.

approaches will still not have differed, individual scores would probably still have been fairly similar.

The value of the stakeholder meeting lies in this case more in its formative character. An analysis of the qualitative records (which are in Bahasa) is therefore of greater interest. There is another more fundamental reason for finding little difference between the projects: the fundamental principles of the projects were the same, or indistinguishable to the casual observer, especially after the lapse of time.

5.3. Other influencing factors

In the Flores study, a number of other, potentially influencing factors have been investigated which may affect the degree to which water supplies and sanitation facilities are sustained and effectively used. These are the nature of the implementing agency (government or NGO), the spread of the village projects over various districts with their varying climatic and ecological conditions, the degree of poverty in the individual project villages, their relative ease of access, and the age, technology and complexity of the improved water supplies. The nature of the implementors was found to have made no difference, probably because most of the village projects had been implemented through the existing government staff. Location and climate also made no difference, except for a cultural difference apparent in a greater gender in division of work and social equity in access to water for the western part of Flores.

One further significant set of relationships emerged from the extranous factors, however:

- The older water supplies are significantly more single village schemes which are located in better accessible communities;
- The younger systems are more complex (larger multi-village systems) and are significantly more often built in communities that have more difficult access;
- FLOWS has built significantly more systems in easier accessible villages.[12]

At present, this approach is not associated with significant differences in sustainability and effective use, but this may be because of the lower age of the more complex systems. Qualitative data suggests that the functioning of these younger, more complex systems continues to decline; those that are functioning now may not be working so well, or not at all, in another year or more. The corollary of this is that this study may not have successfully measured the long-term sustainability of these younger systems; the same analysis conducted in two years' time might produce a substantially different result for these systems.

5.4. Failed systems

In the failed schemes, the lack of recognition of problems over sharing and associated aspects of traditional laws and customs has been a major factor. This has come on top of some technical shortcomings and lack of training for, and sharing of village control over installation quality which was also noticeable in many of the still functioning systems.

5.5. Possibilities for further statistical analysis

Independent advice from an Indonesian statistical expert was sought to determine whether the quality of the quantitative data allowed for a more refined analysis, such as regression and factor analysis. Regression makes it possible to predict that if X is improved, Y will follow. Factor analysis helps establish which factors in a whole set are most essential for the found results. Both types of analysis would be very valuable to identify a limited set of

[12] Correlation coefficients of .31* and .-.42**

most important factors in achieving sustained and used rural water supplies. They might make it even possible to construct a measure of community readiness for the installation of community managed improved water supply and sanitation.

Multivariate methods considered were canonical correlations, factor analysis, principal component analysis, and multiple and simple linear regressions. Several assumptions had to be kept in mind that are required for these statistical analyses to be valid, especially since statistical procedures for continuous data are applied to ordinal data:

- The variables are measured on at least an ordinal scale. Although ordinal scales have unknown intervals, in social science ordinal scales are often treated as interval scales. Likert scales, for example, are used in this way. The same practice occurs in natural sciences such as plant breeding.[13]
- The absolute values of the non-parametric correlations are greater than 0.5 and the corresponding sample sizes are at least 12
- The relationships between dependent and independent indicators and sub-indicators appear to be linear

For this purpose, all *A1* sub-indicators, when paired with any *independent* sub-indicator, had correlation coefficients that are less than 0.5 in absolute value. Almost all other sub-indicators, when paired with any sub-indicator, whose correlation coefficients are significant, belong to the same indicators.

Examination of the scatter-plots of those dependent sub-indicators paired with independent sub-indicators whose absolute values of their correlations are above 0.5, none of the dependent sub-indicators seemed to have linear relationships with the independent sub-indicators. SPSS outputs of normal probability plots for all sub-indicators revealed that none of the sub-indicators is approximately normally distributed. Stem-and-leaf plots confirmed the above result. If performed, K-S Lilliefors test for normality should also confirm to the above result.

This analysis indicated that the data base was not robust enough to allow for such more advanced statistical analysis. Applying any variable transformation to the data wouldn't help much due to the fact that Flores data are ordinal in nature. Even if statistical procedures (for continuous data) could be used to transform variables, in terms of the intentions of the Flores data study, the data would lose their meaning.

Hence, the identification of a limited cluster of the most essential socio-organisational factors to predict sustainability will depend on more experiential methods of learning in the field, on the basis of the findings from the current study.

[13] Plant breeders measure the resistance against rust in grasses by scoring their varieties on a two-point scale from one to nine. The occurrence of rust on individual plants is not physically measured, but is estimated through observations at different times of the year, often by different people. The breeder assumes that, based on experience, the degree of difference between scores three and five is equal to that between scores seven and nine. He or she also assumes that the scoring by person A does not differ from that of person B. Used with sufficient caution, this procedure has resulted in new rust-resistant varieties in fodder grasses and for lawns.

6. Conclusions and Implications

6.1. Strengths and weaknesses of the projects

A considerable strength which emerged was that, once water supplies had been completed, they have generally continued to operate. All completed water supplies, with a maximum age of eight years and an average of almost five years, still gave water. The amount and reliability of this water supply were problematic, and here major lessons can be drawn.

The water quality was less of a problem as far as the consumers are concerned, with the exception of high turbidity in the rainy season. However, the fact that many piped gravity supplies do not operate for 24 hours in combination with poor drainage conditions at public taps even during the dry season increases the risk of contamination through back-siphoning. This and the first problems emerging in catchment areas, and a situation in which chlorination and regular water quality testing are not feasible, means also that water quality issues will need more attention.

Another positive aspect was that from a public health perspective, an average access of 85% in the sample villages is quite good, especially for older schemes. From a social perspective, it is less satisfactory that only a few water supplies give access to all community households.

The demand responsive approach of the projects “avant la lettre” has born fruit in the sense that in almost all villages with a completed water supply, problems with the sustainability of the system are addressed to the extent that the systems continue to work, at least to some degree. The quality of the management, especially the whole institutional and financial side, is weak, however, and it is here that great progress can be made.

Encouraging is that where capabilities and equity are better, the results, though not optimal, show a significant positive difference compared with other communities where such conditions have not emerged. A lot will still have to be done, however, to develop such conditions in these other places. Gender and social equity, which turn out to be important for better results, are generally still very low in Flores.

A strong point on sanitation is that it was included in the projects, and that once latrines have been installed, total non-use is rare. The projects have not taken sanitation seriously, however, despite its great relevance for public health, and an effective approach has not been developed. Those who could have afforded best to pay for their own latrines have probably benefited most.

Knowledge of health and hygiene is quite well developed and in general, all groups seem to have reached the same level of knowledge. From the participatory hygiene tools a few weak areas emerged, however. Safe disposal of the excreta of infants and babies is a high priority. There seems also to be no real differentiation of knowledge on when washing of hands is most crucial. Poor men mentioned for example the problems of keeping hands clean when working in the field, although hands that are literally ‘soiled’ (that is, dirty with soil) do not constitute a health risk. Finally, there is the consistency of latrine use by all groups, but especially by the older generation in more isolated villages.

Technically, the water projects can improve. The transmission pipeline, the distribution network and the standposts are the weakest points. River intakes are more problematic than spring catchments. Village control of construction makes a difference, butrequires significant technical assistance.

A number of projects in the original random sample failed completely and could not be evaluated. More work could be done on the analysis of those in relation to the whole

sample, but it is possible to draw some conclusions from the existing analysis. The failures highlight the consequences of not following demand-responsive approaches; and in those sites where demands were clearly expressed, the need for social intermediation to resolve the serious conflicts which became apparent.

For these and other strengths and weaknesses, reference is made also to Table 11. In this table, the lowest mean community scores, and therefore those with the greatest potential for improvements are presented along with some of the best averages and their standard deviations.

Table 11 Strengths and Weaknesses on the basis of the average community scores

Strengths	Mean	St.dev	Weaknesses	Mean	St.dev
Quality of construction materials	82	21	Water quality testing	10	14
Water quality of the source	90	20	Coverage of O&M costs	16	21
Timeliness of repairs	83	25	Equity of payment system	26	34
Access/use of improved water supply	85	24	Quality of budgeting	13	22
Value for cost poor women	80	14	Quality & transparency accounts	23	35
Value for cost poor men	78	12	Drainage conditions	24	26
Value for cost well-off women	80	13	Access to latrines	46	30
Value for cost well-off men	74	12	Safe excreta disposal babies	24	27
Division contributions (construct.)	87	23	Say in choice of technology	18	27
			Quality of distribution net	43	26
			Women in mngt decision-making	20	33
			Equity in committee at planning	11	16
			Gender equity in training	33	26

6.2. Lessons learned and implications for future program design

One of the most striking lessons from the evaluation is about project rules. To be effective, they must be developed together with community women and men who are not the elite. Evaluated project rules had been set one-sidedly. They were not effective and , in fact often worked against development:

- Charging a flat rate per person in household means that poor people, with larger households, a lower per capita use of water and a lower payment capacity pay relatively more, while the rich, with more means and reasons for water use are encouraged to use more, and not less, water;
- Forbidding women to wash (their clothes, themselves and their children) at the taps reduced hygiene, increased water collection work and did not address the actual problem of poor drainage. If poor drainage was the problem, why not address that with the users? Communities or neighbourhood groups may also be interested in building
- washing and bathing facilities in the neighbourhood of public taps if they can organize for their construction (with cost sharing) and maintenance, including adequate drainage.
- In designing the systems, it has apparently been assumed that it is better to give some water than none. More water for hygiene is, however, at least as important for health as safer water, and if women need to walk far for more water, they will not be able to enhance hygiene. Especially in dry areas, water is also an important source for domestic productivity and so for livelihood. Future designs will have to take such aspects into account

Ignoring conflicts over the use of a source and supply to villages on whose land sources are located or pipelines are laid have been major reasons for failures and vandalism. New

projects will need to tackle such problems in a systematic and skillful manner, including through conflict mediation skills and taking advantage from experiences in solving similar problems in other places.

In village capacity building for water supply and sanitation, management, including financial management and accountability to the male *and* female head of each household for service delivery and financing are priority subjects.

In any projects that aim at an impact on health, sanitation and hygiene need to become, and remain, measurably priority subjects from the start. The people's strong consensus about priority hygiene changes makes it possible to plan a future programme around a few key measurable changes, to which villages and village groups can always add their own local priorities. Safe disposal of babies' excreta, consistent latrine use and hand washing at critical times and for critical forms of soiling, and in dry areas use of more water for hygiene are some of the emerging priority subjects.

Designing any hygiene and sanitation programme will imply also the development of a social equity focus and a gender perspective. Under the latter, also men and male leaders may be addressed on their responsibilities to improve local hygiene conditions and practices, including their own, set examples for sons and become aware of, and begin to address, women's problems of lack of time, work load and lack of money for hygiene and health.

So far, installing and using household latrines have been addressed as the sole responsibility of individual households. Seen from a perspective of public health, achieving full coverage and use of latrines is not only a responsibility for the household level, but also includes an element of a neighbourhood and village responsibility. In the more organized communities, it may be possible to test a community-management approach to domestic latrines, whereby social maps and welfare classification help in setting up cost and labour-sharing mechanisms within the community to help those who cannot build their own latrine.

From the findings on sustainability and effective use emerges that empowerment with equity needs to precede all infrastructure development. Only when a village has achieved a certain level of capacity and equity should a technical local water supply and sanitation project start. Good engineering advice and backstopping and enhancement of village skills for men *and* women for controlling the quality of construction then become very crucial, irrespective of whether a contactor, village craftsmen and/or an NGO or a government agency does the construction. In all these cases, a group of locally and carefully chosen village men *and* women should have the knowledge and legal means for monitoring and control.

An empowerment approach to rural water supply, sanitation and hygiene with conflict resolution and enhancement of gender and social equity will require different project rules: another balance in social and technical staff, different attitudes, knowledge and skills for both types of staff; different job descriptions and performance evaluation, more and different training and a shift in organizational culture and management priorities to capacity building.

Although it was not possible to develop a "WSES readiness index"on a statistical basis, it may be considered to construct such an index, and test it, on the basis of the present findings. With such an index, and the concerned MPA tools and techniques for its application, it may become possible in future to classify communities into groups with different levels of capabilities for WSES projects.

A new project could then develop various packages to assist these groups to undertake their own WSES projects, at their own speed and adjusted to their own capabilities. Thus,

communities with a high empowerment and equity score, good financial and management skills and basic technical knowledge may need no other support than financial support to develop a good water project plan and design, a professional review of the plan when it is ready, and funds and occasional help from a helpdesk and/or backstop to carry it out. Less developed communities would start with capacity building and with a different timeframe.

6.3. Links with ongoing policy development

Many of the findings and conclusions from the evaluation which have been presented in this report are in line with the policy recommendations for the development of community managed water supply, sanitation and hygiene projects formulated under the WASPOLA project. The area where the Flores evaluation study may be able to contribute further to the WASPOLA project seems to be in the operationalization of some of the principles of the new policy as laid down in the proposed policy guidelines for community managed water supply and sanitation[14].
The outcomes from the Flores evaluation confirm this strategy, but show also that it is important to define whose capacities need to be developed, for which skills and where improvements are possible. More in general, the study shows that issues such as gender equity and poverty perspectives need to be addressed cross-cuttingly: in the development of a legal framework (strategy 1), HRD (strategy 2), and cost-recovery and cost sharing (strategy 3 and 4), which may involve differential cash and labour contributions from different groups within the community. In strategy 5, decision-making, the Flores study shows that it is important that policy and strategies define *which groups within the user community* should be involved in decision-making and on which aspects, and that it is important to link this with management functions, training and the composition and legal position of local water management organisations.

Guidelines, in strategy 7, can build upon a number of lessons and replicate some key tools from the Flores study, such as how to budget realistically for operation, maintenance, repairs and extension to keep up coverage, and set equitable tariffs in relation to local welfare classification. The study also confirms the need to cut across boundaries, not only administratively but also in the purposes for which the water supply is designed. On the UPS (facilities management group), the study shows that more can be said about composition and formation. In particular, its results show that it is important for the success of community managed services to go beyond "the community" and be more precise about who/which groups must be involved and in which aspects. Finally, the outcomes provide insights into some of the possible indicators and tools for monitoring empowerment, use and effective functioning and management of water supplies.

6.4. Insights on the use of the MPA

The experiences in Flores have shown that with proper preparation, it is possible to sample under difficult field conditions and with logistic and time constraints. They also show that this investment pays off in the quality of the data. An implication is that much more information, both qualitative and quantitative, has emerged than can be analysed in a first round. This makes it more urgent that, next to initiatives to expand and refine the methodology with more and new elements, efforts are undertaken to 'go back to the basics'. This will involve seeking to identifying the core of the (by now) very large set of indicators, and reduce and simplify some of the scales.

The training, an improved field book and recording sheets, and especially better quality control have made a difference for the amount and quality of the data. With regard to

[14]Indonesia, Republic of (2002). Development of community-managed water supply and environmental sanitation facilities and services. Jakarta: Ministry of Settlement and Regional Infrastructure, Ministry of Health, Ministry of Home Affairs, Ministry of Finance and National Development Planning Agency (BAPPENAS).

process aspects which aim at gender and poverty, the results on participation are encouraging considering that this was a large, time bound study in an environment with low gender equality. On the one hand, far fewer women participated than men: 38% on a total of 2983 participants. On the other hand, meeting in sex disaggregated focus groups worked well: only nine of the 424 meetings had no women. Their absence was much more conspicuous in the sessions with the local water management organizations (most of them have no women members) and in the meetings on social mapping. These are open meetings at the start of the process and in 70% only men took part.

This finding is in line with wider experience that the poor and women will not easily come to open meetings outside their own areas. Adopting the alternative strategy of doing the mapping in sections in each neighbourhood should therefore be considered. This may also facilitate attendance of the poorer neighbourhoods in the general review meetings, where their participation is still low (see below).

The social map is an important tool because it gives the whole layout of the water supply in relation to the local settlement and contains key information on water and sanitation access and social welfare. It is also a great icebreaker in community meetings. Gatherings that start off very static break up and become very animated with a lot of dialogue and movement as soon as the social map is rolled out on the floor or hung on a wall as a basis for presentation of group results or dicussions. Facilitation quality remains nevertheless crucial to ensure that women and poor villagers are not silenced, but present their viewpoints with the same respect and influence as given to other groups.

The strategy of focus group meetings with poor people on the basis of the social map and welfare classification has worked well. In only one case was this meeting only with poor women. Less than 2% of the focus group meetings with the poor did not materialise.
The separate sessions were extremely important to bring out the different perspectives and avoid bias by those in power. Box 17 is one of the cases in point.

Box 17 What is truth? Differences in the ways the rich and the poor experienced the project

In Wolotolo, separate discussions with the upper and lower classes revealed different perspectives regarding the project implementation, and right of voice and choice in final decision-making.

According to community leaders/elite/rich	According to poor men and women
• *FLOWS staff* decided on level of service, because they are more knowledgeable about the type of facilities that would be most suitable.	• Although FLOWS was the project implementer , the decisions about what type and level of service to have, and who should get what was made by the *village head and the elite.*
• During construction, a general meeting was held which involved all the people in the village (all social classes), and the village head, and decisions regarding the water-facility management were made by *all community members.*	• The BPSABS and a Kesling (village environmental health volunteer trained in sanitation) made decisions about operation and management of the facility - *without involving the rest of the community members*.
• The laying of pipes from the water source took *2 weeks of work*. The construction of the reservoir took 1 month	• The fixing of pipes from the water source *took 4 days*. Building the reservoir took 9 days with work hours being from (8:00 AM to 3:00 pm)
• *FlOWS staff* provided guidance and information to the community	• *No guidance* was available from outside the community

Source: Fieldworkers report

A measure to enhance quality that did not materialize was to use the training as a selection tool. In total, the training had 53 participants, of whom 40 were needed for the field study. This made it possible to choose the forty participants with the best combination of facilitation and content skills and the greatest demonstrated sensitivity to gender and social equity. The other participants would become the standbys for the study.

In practice, this strategy was not applied because commitments had already been made to some of the candidates. The lack of selection seems to have affected especially the quality of the community review meetings, where the groups present their results of the individual tool sessions and the participants discuss the overall implications of the findings and may plan further action. At these meetings, the facilitators were still quite dominant, possibly because of their lack of experience and preoccupation with data collection. Villagers, including women, did not really lead during the meetings, as has happened in some of these meetings inother studies in Indonesia, and follow-up discussions did not often get well off the ground. Another shortcoming was that in these general meetings, the poorer sections of the community often did not participate or were under-represented. Further work on this element of the MPA and on the stakeholder meetings remains necessary

Qualitatively, the data from the communities are strongest, followed by those from the stakeholder meetings. The information from the policy workshop is the weakest. There are several inherent reasons for this. First, a lot more is known about sustainability and use factors in communities than in agencies. The theoretical basis of the MPA is therefore stronger for the community analysis than the agency analysis. Secondly, the institutional scales are quite complex to understand. Differences in degrees of approaches for gender, poverty and participation are subtle and require some understanding of underlying theory. As attempts are made to arrive at this understanding through open discussion, it is possible that those who understand more quickly than others and have a hidden agenda will vote for the desired rather than the actual score. Thirdly, the study can show less differences in agency approach because it is not comparing independent project approaches. Many of the staff who carried out the projects belonged to the local district and higher level government staff. This reduced the potential spread of scores as the same staff with the same training and management carried out the different projects. The institutional scores are therefore inherently less diffentiating and less reliable than the community-level scores where different groups analyse and score conditions and practices in separate sessions.

As a study, the MPA evaluation has been exciting, stimulating and an excellent learning experiences in which great fun was head by all. Special challenges have been the scale of data collection and the preservation of a balance between competing demands. The study in Flores has been the second largest MPA study in Indonesia and a vast quantity of information had to be collected and reported. There are demands on the quality of information and reporting which must be met, and this requires attention to rigour and quality of process throughout.

Methodological soundness has required attention to sampling to avoid bias from omission of some distinct and relevant groups such as women and the poor and over-representation of others, such as the elite in easily accessible, and therefore often better off, villages. Errors of validity to be guarded against come from mismatches between the source of information and the nature of the knowledge sought. The better accounts came from those who experience conditions and practices and are corrected by their peers. Open dialogues with groups and conscientious qualitative reporting were crucial for a correct understanding of village and group realities and not putting one's own interpretations on what was being observed.

In a large participatory evaluation with quantitative data collection on demand of outside agencies, there is an inherent tension. On the one hand, the MPA is all about empowering the villagers, and the facilitative, non-assertive approach required to achieve this objective. On the other hand, a substantial amount of high quality information had to be collected.

The latter requirement reduced opportunities to empower village women and men to locally tackle their problems through participatory knowing, analysing and acting upon information. This tension is unavoidable. Nevertheless,further insights have emerged on how the balance between these two major objectives can be improved.