

Resolving Water Conflicts Through Participatory Decision Making : A Case Study From The Nakanbé River Basin, Burkina Faso

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Abstract

Water's importance for socio-economic development cannot be over emphasised. Not only is it key for human survival and welfare, but it is also an essential resource in agriculture (land irrigation, farming, breeding), health, hydroelectricity and industrial production for which there are no substitutes. Unfortunately, in Burkina Faso divergent economic, political, and social interests, the absence of adequate rules governing its use, and the lack of dialogue between the different players and stakeholders, have resulted in frequent conflicts between water users.

Over the course of the last two decades, it has become clear that managing conflict is essential to the sustainable management of common-pool resources, such as water. One approach towards managing water conflicts is the Integrated Water Resources Management Approach by Watershed Basin (IWRMA), which uses participatory approaches to help resolve conflict. The IWRMA refers to a system of decisions and actions about water restoration and conservation. Recent research supports the notion that the IWRMA is perhaps the only approach that is able to efficiently integrate all stakeholders, as well as structural (economic, social, legal) and environmental factors, into the decision-making process (McNitt and Kepford, 1999; Petersen, 1999; in Black, P.E., 1996).

This paper present the main results of a project, sponsored by IDRC from 1998 to 2003, which employed a participatory methodology for resolving water conflicts in the case of 19 villages in the Nakanbé River Basin, Burkina Faso. In these villages, especially at handpumps, intense water conflicts arose between women and girls or between women, girls and stockbreeders because of the water's insufficiency for all users. These conflicts often resulted in disputes or quarrels between two or more end-users. The Participatory Decision-Making Aid Approach divided the conflict resolution process into ten steps and involved all stakeholders in mediation activities such as informal discussions, roundtable discussions, meetings and forum discussions, and theatrical representations. The solutions, proposed and implemented with the involvement of all stakeholders (mainly grassroots stakeholders) fell into three distinct categories: 1) technical solutions, 2) solutions aimed at changing mentalities, behaviours and taboos of the local population about water use and water conflicts, and 3) solutions related to restructuring water management committees. The result of these grassroots-initiated interventions has been fewer water conflicts between users around water handpumps in the majority of villages and the increasing of the villagers' autonomy with regards to the management of the water supply. The Participatory Decision-Making Aid Approach holds promise as a conflict resolution mechanism for managing conflict in different circumstances and with other common-pool resources such as land and forests.

Introduction

In Burkina Faso, because of insufficient water for socioeconomic activities and serious scarcity problems, there are often conflicts between water uses and between water users such as drinking water supply, agriculture (land irrigation, farming, breeding), fishing, health, hydroelectric power, industrial production, and small-scale village production (restoration, flour-milling, production of local drinks, and brick-making). This helps to explain the impetus for a development project about the problem of water conflicts.

In Burkina Faso, rains is the only source of groundwater and surface water resources. The country is drained by four large river basins : Niger River Basin, Nakanbé River Basin, Mouhoun River Basin, and Comoé River Basin.

Diverse studies and investigations (Anonyme, 1998, GIRE, 2001) agree that it is in the Nakanbé River Basin that the problem of water conflicts is often observed. The area of this River basin covers entirely or partially 22 provinces out of a total of 45 in Burkina Faso. It has a population of about 3,723,627 people, or 33% of the entire population of Burkina Faso. It constitutes multiple interests related to water because of various hydro-agricultural achievements and diverse socio-economic activities related to water.

In the great hydrosystems of Nakanbe River Basin such as Kanazoe, Ziga, Bagré, Loumbila Dams, and Bam Lake, conflicts generally arise over quantity and quality of water, land management issues, and regional planning precisely because of divergent interests between various water uses. However, in the village setting, especially at handpumps and modern wells, water conflicts often arise between women and female adolescents or between women, girls and stockbreeders because of the water's insufficiency for all users. These conflicts are often related to disputes or quarrels between two or more end-users (N. Kibi and K. Sanon, 2003).

As a result of the complexity of water conflicts related to cultural, economic, legal and social issues, at the beginning it was very difficult for us to use the traditional approach of water resources management where decisions are taken outside the community or without consulting the beneficiaries, and the solutions are often imposed by the technocrats, government managers or International Aid Projects' representatives. Rather, we chose to work with approaches

involving directly all stakeholders in the decision making process in a context of interaction and interpersonal communication. Hence the need to set up a Participatory Decision Making Approach involving all stakeholders.

As a result the *CEDRES* of the University of Ouagadougou in Burkina Faso, and the *IE*, a branch of the INRS-ETE of the University of Quebec in Canada collaborated on the research project entitled "*Managing conflicts over water resources in the Nakanbé River basin in Burkina Faso*". The project received funding from the International Development Research Centre (IDRC) from 1999 to 2003.

The main objective of this project was to design a participatory methodology for resolving water conflicts between large, medium and small water users. This paper describes the implementation of this approach to resolving water conflicts at water sources such as handpumps and modern wells, which occur between women, female adolescents, stockbreeders, market gardeners, and merchants in 19 villages of the Nakanbé River Basin.

The paper is divided into five sections. The first section presents the research problem and main objectives, while the second and third sections elaborate on the theoretical and methodological approaches of the study as well as project Implementation. The fourth section presents the research results and discussion. The final section presents the conclusion of the study.

1. The Research Problem and Main Objectives

The Nakanbé River Basin covers an area of approximately 33,000 km² and drains water from twenty-two provinces of Burkina Faso including the city of Ouagadougou. To collect data about water resources and water conflicts, the Research Project's Team (RPT) designed a sampling plan. It divided the River Basin into three zones according to three reference hydro-systems. The first zone used Bam Lake as reference hydro-system, the second zone used Bagré dam as reference hydro-system, and finally the third zone used Loumbila dam as reference hydro-system. To facilitate the study, in each one of these zones, the RPT decided to select a limited number of villages according to criteria related to the available water sources, such as distance to the reference hydro-system, access conditions, socio-economic activities, and existence of women's associations, because in village setting, drinking water is collected and managed by women. The distance from the village to the reference hydro-system was considered as a specific criterion of choice, with an aim of evaluating whether conflicts were linked to the distance or the proximity of the village from one of the reference hydro-systems. According to this specific criterion, four regions were defined: bordering villages (directly near a reference hydro-system); villages located within a radius of 5 kilometres of a reference hydro-system; villages located within a radius of 10 to 15 kilometres of a reference hydro-system; and villages located within a radius of 25 kilometres to a reference hydro-system. For the three zones of the Nakanbé River Basin, a village was retained in each of the four defined regions. Each sampled village is presented in Table 1, while Figure 1 presents the Nakanbé River Basin inside the Burkina Faso Map.

(Insert Table 1 and Figure 1 about here)

The preliminary research and investigations led by the RPT, informal discussions and meetings, and the roundtable discussions involving all stakeholders organized at Ouagadougou in September 2000, demonstrated that at the local level, three main problems are likely to create the water conflicts within a village – lack or insufficiency of water resources, poor management and ownership of existing water infrastructures and lack of communication between end-users. In addition, there is also a cause to effect relation between water conflicts, hygiene around water sources and the prevalence of certain water related diseases. Additional circumstances such as

ancestral beliefs, ethnic and political considerations, and certain taboos make the problem even more complicated.

Two main questions can be asked. How do the water conflicts arise in a village setting ? And which end-users are involved and how are they participating ?

In the village setting, specifically during the dry season, various conflicts occur between women, girls, female adolescents, young boys, stockbreeders, farmers, merchants-women, brick-makers, and outsiders to the village. These conflicts can concern quarrels or disputes between any users, who often do not respect the water collection schedule at handpumps. The disputes may also take place between other users and stockbreeders when this last need to supply their animals with water because there is generally a lack of watering holes beside handpumps. Water conflicts are also related to ethnic or religious problems such as not following ancestral beliefs (for example taboos about symbolic hours for not collecting water in the village - before 5:00 am or after 6:00 pm) important to one ethnic group can be the source of disagreements or quarrels between the two ethnic groups. Other types of conflicts arise when end-users who believe water is a public property or a gift from God refuse to pay for the maintenance of handpumps to the detriment of users who accept to pay the price of water collection at handpumps. Quarrels also result when people mistrust non elected members of water management committees (WMC), or when a wife of the treasurer of a WMC refuses to pay for water because her husband works without being paid. Finally, there is also conflict where young men of a village without water can be rejected in marriage by girls of a nearby village who fear the burden of finding and collecting water, once married.

In these different conflicting situations, the mechanism to resolve water conflicts requires acknowledging the multidimensional nature of this problem, thus placing the end-users at the center of the process. It also requires the involvement of stakeholders in the process.

At village handpumps there are various types of conflicts which involve different users. As mentioned above, for example, there are several disputes or quarrels between women, girls, young boys, and stockbreeders around handpumps. At Gogninga one of the villages in the Bagré Dam's zone, the merchant-women cause problems when they show up at a handpump because they do not respect the collection schedule. At Kora, one of the villages in the Bam Lake's zone,

Peuhls people (one of the Burkina Faso's ethnic group) prefer to go without water instead of sharing the handpump with the Mossi people (another ethnic groups) who are Christians and eat pork. Peuhls people have a tradition of not eating pork, and therefore do not want to touch water used by Christians who do eat pork.

In these various cases, one of the research questions asked was, how can disagreements between users antagonists be eliminated their relationship improved ?

Since many identified water conflicts have social roots, it is essential to favor awareness campaigns aiming to change end-users's mentalities and behaviours regarding the water conflicts and implementing solutions. To succeed, the campaign must involve all stakeholders mainly the end-users. The effective participation of stakeholders in the process will create a sense of belonging and responsibility likely to have an impact on solutions implementation. In other words, the participatory approach will allow effective implementation of the solutions proposed by the stakeholders.

The study's objective was twofold. Firstly, researchers wanted to involve all stakeholders in order to identify, define and approve (agree) the water conflicts around villages handpumps between women, girls, young men, farmers, stockbreeders, and merchant-women. Secondly, they wanted to design and implement solutions for resolving water conflicts through a Participatory Communication Approach with the specific objective of transferring know-how and the methods they developed in a small number of villages to a greater number of villages.

Before to elaborate on the Participatory Decision Making Approach for resolving water conflicts, we present in the following section the theoretical and methodological approaches of water resources management.

2. Theoretical and Methodological Approaches

2.1 Theoretical Approaches

Resolving water conflicts can be carried out through an Integrated Water Resources Management Approach by Watershed Basin (IWRMA). Several recent articles support that the IWRMA is the only approach that is able to effectively integrate all stakeholders and economic, social, legal and natural factors into the decision-making process (McNitt and Kepford, 1999; Petersen, 1999; Kenney, 1999, Butcher, 1999 in Sasseville and Maranda, 2000). These factors in combination are necessary to determine the quality and quantity of water at any point in a watershed basin. The water flow in the watershed basin integrates bio-geomorphologic and socio-economic factors in a system of relations "Individual-Society-Resource" that one must seek to optimize in the relationship between stakeholders and participants. The IWRMA has the following in common with other paradigms related to managing natural resources - provides a framework for problem analysis, which is based on a systemic perspective (Montgomery et al., 1995), aims to improve the performance of existing development institutions, integrates public policies, and coordinates various actions concerning governmental and non-governmental organizations, and supports participation of public and key actors in the decision-making process. Finally, IWRMA generally require a solid base of scientific information, which support government policies (Imperial, 1999).

P.E. Black (1996) asserts that the problems of water resources management relate more to governance than instrumentation or techniques. He suggests that the main problem for sustainable environmental management of water resources is not a lack of interventions tools or orientations on the use of these tools. Instead it is a failure of their use on the scale of the watershed basin.

Two fundamental elements characterize the IWRM Approach - the principle of Participatory Decision Making-Aid in the implementation of solutions adopted by all stakeholders, and the need for information based on reliable scientific data, which supports decision-making about the use of water (Imperial, 1999; Reimold, 1998; Griffin, 1999; Grigg, 1999; Kenney, 1999; EPA, 1995).

Approaches to resolving natural resources conflicts generally focus on the nature of interventions such as consultation, mediation and negotiation involving several actors (Anderson et al., 1996; Ayling and Kelly, 1997; Brown, 1983; Gass et al., 1997; Grimble and Chan, 1995). These methodological approaches, where the stakeholders are regarded as actors, are not very easy to apply in rural areas, especially to solve certain multidimensional problems such as the conflicts that occur around handpumps or modern wells. During the two last decades the concept of “actor” has been gradually replaced by that of “stakeholder”. While the concept of actor refers to action, therefore to a form of implication in the decision-making process, the concept of “stakeholder” incorporates all people, groups or organizations, which have in common problems, goals, interests or decisions into the decision-making process (Keeney, 1992; Banville and al., 1993). A stakeholder is impacted by the formulation of problems and solutions about water conflicts, and therefore should have influence over this process. This formalism is different to consultation, mediation and negotiation where the participation of decision-making process is not evident.

A stakeholder is an individual, a group, or an organization effected by a problem, and therefore should have an influence on decisions about managing the problem (Banville et al., 1993). Several interpretations of this concept are documented in the literature and Table 2 details a typology suggested by Banville et al. (1993). We consider this typology as a basis for the analysis stakeholder participation in the decision making process.

“Standard Stakeholders” are stakeholders who are affected by the problem contribute to its definition, and participate in the process of formulating solutions and taking action to resolve it. The Standard Stakeholder corresponds to a somewhat general view of a democratic decision-making process where those effected by and causing a problem participate in its resolution. Standard Stakeholders is so named because, when the concept of stakeholders is used in the literature without any specification, it is often in reference to this ideal type. Restricting the concept of stakeholder to a sole category is an oversimplification that impoverishes a rich notion and creates confusion. Thus, other types of stakeholders must also be taken into consideration.

(Insert Table 2 about here)

"*Fiduciary stakeholders*" are actors elected by someone. They take part in the process of formulating and resolving a problem without being personally affected by the decision.

Other stakeholders do not have any direct control on the decision although they are affected by the problem. If these stakeholders take an active role in the process of formulating and solving, they are qualified as "*Concerned and Active Stakeholders*", for example, citizens who take part in public audiences. If the stakeholders do not take an active role in the process of formulating and solving, they are considered as "*Concerned but Passive Stakeholders*". For environmental problems, future generations such as those which constitute the "silent majority", are examples of this type of stakeholders. A fifth type of stakeholder is called "*Behind Doors*". They are those who, although affected and having an influence on decisions, do not take part formally or directly in the decision-making process. These non-participating stakeholders are sometimes powerful enough to impose a veto on a decision, for instance top management concerning certain projects inside their organisation. Finally, "*Invisible*" stakeholders have an influence on the process of formulating and solving problems, but they do not take part in it because they perceive that their individual influence is too weak or that they have elected fiduciary stakeholders to represent them.

It is clear that the level of stakeholders involvement to resolve problems through a participatory decision-making process have an influence on the decision or the solution to the problem arising and its application depends on it.

D.S. Keeney (1992) identifies three classes of decisional situations - a consulting or autocratic decision, negotiating or decision by unanimous consensus and a participatory decision, which involve all stakeholders. I.W. Zartman (1977) also made a distinction between the three models of decision, which corresponds well to the situations suggested by Keeney. He considers three elements in the decision-making process. First, the legal process, which consists of electing a person to formulate a synthesis of the points of view of conflicting the stakeholders, and which culminates in a final unilateral decision taking the form of a judgement. Second, the coalition process by aggregation (votes or others ways) or by collegial decision. Finally, the negotiation process is distinguished from the first two processes because the stakeholders recognize the right of veto, they are not forced to accept a solution in the event of disagreement.

Although these decisional situations or models are distinct in the literature, it seems however, that in the majority of cases, the involvement of stakeholders in the decision-making process cannot be limited to the two poles of a continuum namely, simple consulting (or autocratic decision) or negotiating (or decision by unanimous consensus). There is indeed a third mode of decision making, identified as "Group Decision" and "Coalition" by Zartman. It is what is recognized more and more as participatory decision-making.

Participatory decision-making corresponds to a situation where several stakeholders (for example, decision-makers, experts, general public, etc.) are involved in the process in order to give it. However, in many situations, stakeholders do not share the same importance or the same role. It is thus necessary to conceive a procedure, which will allow stakeholder involvement at various levels. Each stakeholder will then be able to express their view and thus, to have a small impact on the decision. The legitimacy of this type of decision-making process is not the same as in the case of a negotiation where a consensus is necessary for a decision to be made. Just as in negotiation, the decision-makers must yield part of their sovereignty to other stakeholders inside the established procedure. The legitimacy of the participatory decision is found rather in an "implicit" starting consensus, the stakeholders agreeing to subject themselves to the procedure planned for the adoption of a solution. We can compare this with the principle of democracy, all the voters do not agree with the choice of a head of state or a deputy, but his nomination is legitimate since the driving process for his nomination, the electoral system, is legitimate to voters.

The challenge of participatory decision-making is to establish a procedure that addresses conflicts between divergent points of view while also being a legitimate democratic system. When one wants to develop such a procedure, one inevitably thinks to the impossibility theorem of Arrow (1951) which shows the difficulty in combining multiple preferences in a collective preference without resorting to imposing one's point of view to others.

We must accept that there is not a general model of stakeholder involvement appropriate for all situations. Yet, there are as many models of stakeholder participation as there are problems to formulate and solve. It is thus necessary each time to conceive an involving procedure of stakeholders who agrees with the decisional situation. The involving effective various participants in a decision-making process is the main objective of the managing of the

involvement of stakeholders. It is a concept which initially aims at identifying the all involved stakeholders and determines then their involving mode in the process.

The following section presents the methodology used in the study.

2.2 Methodological Approaches

This methodology is divided into ten steps - Initiating the process; Identifying, defining and validating water conflicts and proposing solutions by stakeholders; Managing stakeholder participation; Developing of a Typology of water conflicts; Evaluating and selecting solutions with stakeholders; Approving final solutions with stakeholders; Evaluating the feasibility of proposed solutions; Organizing stakeholders participation in implementing solutions; Implementing solutions; Establishing a feedback mechanism.

Figure 2 shows the Flow chart of the Methodological Approach.

(Insert Figure 2 about here)

3. Project Implementation

3.1 Initiating the process

After planning the project's activities and before starting, the RPT held meetings at the beginning of December 1999 with the Ministry in charge of water resources to inform and involve the authorities representing the three zones. The aim was to gain legitimacy for the project and confirm our role as mediator. The fieldwork began by identifying of all stakeholders. We considered all persons implied directly or indirectly in the management and use of water resources in the sites of study. Thus, after various meetings and discussions with diverse interveners, we identified two stakeholders categories - community stakeholders and decision-Making stakeholders ".

The community stakeholders included farmers, stockbreeders, fishermen, women, girls, men, boys, merchants, village construction workers, administrative and local village authorities (for example, administrative delegate, chief of village, chief of clan or chief of land). The decision-makers stakeholders included government managers (mainly people in charge of General Office of Hydraulic and Regional Offices of Hydraulic), local and regional public authorities and partners in development, as donors, experts, and researchers. This step helped the RPT to develop local collaboration and partnerships.

3.2 Identifying, defining and validating water conflicts and proposing solutions by stakeholders

The principal aim of this study was to define current and potential water conflicts at the villages' water sources, determine their causes and propose solutions with the participation of all stakeholders. During this step the RPT used the participatory process to develop an appropriate participatory communication strategy. This participatory communication strategy consisted of the following five points - Identifying communication needs, Matching each communication need with one or more communication objective(s), Identifying the different stakeholder groups, Choosing appropriate communication activities, and finally Defining topics and messages related

to behavior change for collecting water, water conflicts and solutions for resolving water conflicts.

In the participatory communication strategy, several potential communication activities or tools were possible. We favoured dialogue and an effective circulation of information among the community stakeholders with simple, accessible and local communication tools. The communication activities chosen included informal discussions, roundtable discussions which involved all the stakeholders, meeting and forum discussions between target groups or all stakeholders, theatrical representations, video documentaries, council meetings (village, departmental and regional levels), Village General Assembly for the election of members of WMCs, radio transmissions.

The communication activities adopted were pre-tested before their effective implementation. They differed from one zone to another and from one village to another. The messages and the topics of exchanges or discussions also differed from one target group to another. Pre-testing involved submitting the communication activities to community stakeholder representatives and obtaining their feedback before the implementation phase.

To identify and define current and potential water conflicts at village handpumps, the RPT used two communication activities - participatory investigations at the local level and meetings. The work was carried out by using target groups. This information made it possible to set up a good understanding of water conflicts and to identify the potential solutions involving all stakeholders. The approval of water conflicts and solutions considered took place through roundtable discussions with all stakeholders organized in Ouagadougou in September 2000. The roundtable discussions allowed a consensus about the conflicts and how to solve them. Throughout the process, an important place was made for the exchange between all stakeholders, which made it possible to find compromise, both for conflict identification and selecting solutions.

3.3 Managing stakeholder participation

To best manage stakeholder participation in the process and to facilitate decision-making, in addition to the target or specific group already existing, the RPT grouped all stakeholders into small groups according to age, sex, ethnic group or cultural characteristics (traditions, values, beliefs), communication habits, lifestyle and education.

After identifying stakeholders and defining and agreeing water conflicts, it was possible to facilitate the choice solutions to work out a typology of water conflicts.

3.4 Developing of a typology water conflicts

In this stage the RPT developed, with the participation and according to viewpoints of all stakeholders, a typology of water conflicts to facilitate the final choice of solutions. The following three types of conflicts were identified – *Social, technical and socio-sanitation conflicts*. *Social Conflicts* are conflicts that stem from cultural, ethnic, or religious considerations. They may also include land ownership. This category of water conflicts is related to the perception of water by the populations (for example water is a public good, a gift of God), the habits or ancestral beliefs and religious characteristics. *Technical conflicts* are conflicts related to the amount of water available for the users, and its quality. They can also relate to the state of the hydraulics infrastructure. In village setting, these type of conflicts occurs mainly around handpumps and are due to the lack or the insufficiency of that. If water is rare, there is the presence or disputes or quarrels between some users around handpumps. *Socio-sanitation conflicts* are conflicts caused by the contamination of surrounding handpump areas due to poor hygiene which can cause diseases related to lack of safe drinking or malnutrition. In this case, the users themselves are not directly in conflict situations, but rather a given conflict takes place following poor water use or the presence of animals around a handpump, which can contaminate water.

3.5 Evaluating and selecting solutions with all stakeholders

The evaluation and selection of solutions to resolve water conflicts was carried out in a participatory way on various levels by the RPT and the community stakeholders. To arrive at a consensus on the solutions to retain, the RPT organized many meetings with target groups, regrouped stakeholders according to certain interests, or with all stakeholders. The RPT also evaluated solutions during other communication activities such as the roundtable discussion organized in Ouagadougou in September 2000. Finally the restitution meetings organized after the roundtable discussions allowed prioritization of some solutions to the detriment of other solutions according to particular interests such as the availability of functional handpumps, the presence or not of a WMC, the involvement of the population in managing the village water resources and the presence of some diseases related to water. The next section presents the procedure used to determine which solutions to implement.

3.6 Approving final solutions with stakeholders

Approving final solutions was carried out during communication activities involving all stakeholders. In this procedure, the RPT assisted and supported community stakeholders to reach a consensus regarding which solutions to implement from solutions suggested by diverse village meetings, roundtable discussions, and meetings restitution of the roundtable. A great number of solutions had retained. The RPT compiled all solutions to evaluate which solution was most appropriate. The next section presents the evaluation of the feasibility of solutions.

3.7 Evaluating the feasibility of proposed solutions

Since not all suggested solutions could be implemented, the RPT carried out an evaluation of the feasibility of each solution in the following four stages. First, all suggested water conflicts during activities of communication, such as meetings, roundtable discussions restitution meetings in the villages after the roundtable were listed. For each village, all suggested solutions by community stakeholders were recorded. Next the RPT formed "Solution-Conflicts" pairings for each village, which associated each solution to the number of conflicts likely to be solved. Finally, the RPT evaluated each pairing according to the number of conflicts likely to be solved by the solution, the acceptability of the solution by all of the village's end-users, and the costs of

implementation of each solution. The final step of this evaluation was completed by the RPT with some stakeholder representatives. This step served to evaluate the performances of each solution according to the three criteria, in order to reflect the preferences of all end-users.

Table 3 summarizes an example of results obtained in the six model villages. It presents the sources of water conflicts, the final definition of water conflicts, stakeholders involved in a given conflict, and solutions retained for each village. These solutions fit into the following three categories. First, the solutions concerned a change in mentality, habit and behaviour of all end-users. These solutions aimed to disseminate information about the solutions to address conflicts and eventually eliminate them. Second, there were the solutions aiming to restructure or reorganize WMCs. These solutions concerned establishing a new model of implementation and operation of WMC. A good and functional WMC guarantees a appropriate water resources management, which also helps to prevent conflict around the village's handpumps.

(Insert Table 3 about here)

Third, there were solutions called support solutions. They are related to the rehabilitation or the construction of new hydraulics infrastructure (mainly handpumps and wells). These solutions aimed to support communication activities, which are at the basis of process of resolving water conflicts.

3.8 Organizing of stakeholders participation in implementing solutions

Stakeholder participation in the implementation solutions depended of the nature of solutions to be implemented. In the case of solutions aimed the changing mentalities, behaviours and habits, participation occurred during the communication activities (for example meetings, forum discussions, theatrical representations). In the case of the implementation of support Solutions, the participation of end-users, took the form of participation in physical and technical work needed to repair or build new hydraulics infrastructure (handpumps). The RPT managed this participation together with the villages population.

3.9 Implementing solutions

The adopted solutions related to the communications activities focused on the changes mentalities, behaviours, habits; the restructuring of water management committees; and the establishment of support Solutions.

3.9.1 Solutions related to changes mentalities, behaviours, habits of end-users

To implement the solutions aimed the changing mentalities, behaviours, habits of the populations related to water use and water conflicts, the RPT, together with populations carried out 103 meetings from December 2001 to June 2002 in the selected villages.

3.9.2 Restructuring of Water Management Committees

The essence of this action is linked to the development and implementation of a new model of WMC, based on a participatory approach (N. Kibi, 2002).

The installation of this new model of WMC will be done in three phases (see Figure 3).

The first phase : installation of a WMC in each water source or group of water sources

This phase is divided into four stages. First, the local population defines and agrees on the number of staff necessary for the operation of a WMC for each village Water Source or group of Water Sources and decides on criteria for selecting members. Next, the village authorities coordinate an "election campaign" for the nomination of WMC members, and organize an election at a village General Meeting. Finally, training of elected WMC members will take place. These steps will ensure that a WMC for a village is accepted by the entire population.

The second phase: installation of a Management Unit of Water Sources for Village Districts (MUWSD)

At the end of three to six month period, a Village Council Meeting will be organized, in which an ad-hoc committee made up of the following people will participate - contact persons from the villages, members of WMCs of each or regrouped water sources, local Administration representatives, the notables (for example village chief, clan chief, and land chief). The objective

of this framework for dialogue is twofold. First, to give a progress report about the operation of the new model of management of WMC (at Water Source level). Second, to develop an integration process of each WMC (Water Source or grouping) to a common structure of village district (or grouping) called the “Water Source Management Unit” for Village Districts (or grouping). The members of this Unit will be elected at a Village General Meeting where the whole village population will participate.

Third phase : Installation of a Permanent Village Framework of Dialogue (PVFD)

After no more than two years, a Village Council Meeting will be organized. This phase will define a framework for the creation and installation of a Village Water Users Association (VWUA). The objective of a VWUA will be to allow the entire village to participate in the management of water resources. To this end, a permanent office (Staff) of the VWUA will then be elected at a Village General Meeting. The Organisational Structure of the VWUA will make up of members of WMC from all village Water Sources. The advantage of the VWUA is that it will have a legal governmental recognition and will set up a uniform system of operation (including a mechanism of follow-up or a monitoring to determine its effectiveness) for all water sources at the village.

The RPT is producing a guide and a video documentary about the mechanism of installation and operation of new WMCs. Each will be disseminated to NGOs, diverse projects involved in water resources management in rural settings through the Regional Offices of Hydraulics of the Ministry in charge of water resources management of Burkina Faso. This will ensure a significant contribution in making permanent the results of the project.

3.9.3 Support solutions

These actions (handpumps restoring, new handpump construction) carried up to support the communication activities in the villages. All actions included the participation and involvement of local populations, which helped to the project’s successful implementation.

3.10 Establishing a feedback mechanism

This step consists to establish a feedback mechanism. It may be perform from any step.

4. Results and Discussion

The study shows that the Participatory Decision Making Approach developed by the RPT allowed local populations to identify, characterise and define water conflicts which arise around handpumps and other water sources, to propose final solutions and to take decisions about how to implement solutions while considering local conditions.

The first obtained results concern the definition and prioritization of some water conflicts. In all villages, social characteristics like traditions, values, beliefs, taboos or religious issues resulted in almost identical conflicts in the three zones of the Nakanbé River Basin. However, the sources of conflicts can differ according to the zone. With regard to disputes or quarrels due to a lack of respect for the collection schedule, present in the three zones between women and girls (and female adolescent) or between women, girls, boys and stockbreeders, the origin of the conflict can be different. For example, during the dry season in all villages, there was always a no-respect of water collection schedule between women and girls or between women. We noticed that at Goué and Silmiougou villages belonging to the Loumbila Dan zone, this problem considered from a social angle, namely, a problem of age groups. Usually girls must observe a respect to older women. When girls refused to respect this rule, the disputes were occurring between women and girls. In the Bam Lake zone, at Kora village for example, the case of the wife of village chief who must move ahead of everyone else in a water collection line was often occurring. This situation caused disputes between this last and the other users.

Another case happened at Gogninga village in the Bagré Dam zone related to ancestral beliefs or taboos such as using black pots for water collection at handpumps. This practice is forbidden by the Mossi ethnic group but not by the Bissa ethnic group. This situation often causes quarrels or disputes between both ethnic groups when Bissa people collect water in black pots.

Some combinations between different sources of conflicts created a new conflict. In the case of conflict called "*Disagreement caused by the refusal to contribute to handpump maintenance by some users at Goué village*", some people refused to pay their contribution because the treasurer's wife of WMC did not pay. Paradoxically in the same village, another

group of users refused to pay for the handpump maintenance because they could not provide input into site selection for the handpump.

The case of girl who refused to marry a young boy who lives in a village with limited water resources because she is afraid the drudgery of the responsibility of fetching water that will be hers after marriage, can be at the origin of disputes between girls and young boys around handpumps. In fact, it was an implicit conflict, because the source of the disagreement caused to the young man was the lack of water in the village.

To resolve these conflicts, during diverse meetings, we focused on exchanges and discussions taking into account social considerations, sources of conflicts, each zone's cultural specificities and the nature of stakeholders' involving to implementing solutions. This allowed quarrels and disputes around handpumps to be solved efficiently, only two years after the beginning of project. For example, the introduction of a water collection schedule to resolve conflict was proposed by women and girls during meetings and other discussions. At Silmiougou and Goué villages the water collection schedule set up by the new WMC functions well. Unfortunately at Kora village belonging to the Bam Lake zone, the water collection schedule functions less well.

Another interesting result concerns the WMC. Generally, the meetings regarding the WMC showed that the majority WMC members had difficulties with managing aspects, such as the not including the population in the decision-making process concerning certain actions, the nomination procedure of WMC staff, and the relations between men and women, women and girls, girls and young boys. The RPT determined the need to re-organize the WMC in setting up a new model for WMCs and the training its members.

The results obtained after three years also demonstrate there is a cause to effect relationship between the WMC functioning and the presence of water conflicts in the villages. At Goué village for example, the population decided to set up a new WMC using the new model elaborated by the RPT for the "Market Handpump" restoring. This WMC is made up of 70% of women. The presence of 70% women in the WMC is notable. This is a great change in population behavior. Today with a new WMC, there are not frequent conflicts, good hygiene practices around this handpump and the end-users mainly women, meet once a month to discuss

and exchange about water conflicts. The whole village works to avoid the conflicts between women and girls or between women, girls, young boys and stockbreeders.

The RPT demonstrated by action research that if the WMC functions well, there is less conflicts around handpumps and excellent contribution to handpumps maintenance.

The results also show that the meeting is an efficiency communication tool in the village setting, because it is simple to carry out, it allows to a small specific group to discuss and exchange views about a topic chosen by the participants, and favours quick decision making. Additionally, the meeting also allows to surrounding population to participate to exchanges and discussions.

Theatrical representations also can give good results with regard to resolving water conflicts. Nevertheless the results are not easy to evaluate in the long term. Community theatre takes more preparation time, and can require many materials and actors.

The study's results also show that to achieve success in resolving water conflicts, end-users must play a significant role because first the success of process is largely related of the behaviour, attitude and commitment of stakeholders, and second, two or more communication activities can be necessary. In the same meeting an example about "*exchanges around problems related to handpumps*" from Loaga village in the Bam lac zone, with women and girls as target or specific groups was presented. During the meeting's exchanges and discussions, women and girls found an area of agreement and good reasons to respect water intake rules. They promised that there will gradually be fewer disputes between women and between women and girls. Consensus needs to be reached between women and girls about how to settle their problems.

The case of traditional village practices, such as the priority of the chief's wife about the water collection line requires more than two or three meetings between the involved end-users. Other approaches can be required to resolve this water conflict. They can include theatrical representations, informal discussions, etc.

Finally, the implementation of the Participatory Decision Making Approach in the case of resolving water conflicts in the villages of the Nakanbé River Basin gave good results. By comparison to four years ago, at the villages Goué, Silmiougou, Kora, Loaga, Bagré Centre and

Gogninga and others, conflicts have been reduced, because populations are happy to have participated in the whole of process. However, the effects in the long term are difficult to evaluate.

Meetings, informal discussions, forum discussions, theatrical representations, exchange trips allowed stakeholders to achieve the study's objectives with the participation of the RPT.

Will village populations involved in the research continue to use meetings, theatrical representations, forum discussions as tools to resolving their water conflicts after the research ends ? We would say, it depends. We think that all participatory making decision approach must build capability within local communities to expect results over the long run. This should normally allows populations to take responsibility and autonomy in water resources management at the village setting.

Conclusion

The Participatory Decision Making Approach for resolving water conflicts developed by Research-Action by the RPT is articulated around defined steps. It should not be regarded as a linear and rigid procedure. Its effective application and its efficiency depend on involving all stakeholders in the process; in the definition of water conflicts, identification and choice of solutions and participation in the decision making process about the solutions to be implemented. The study's objectives were achieved. By comparison to four years ago, today there are not as many conflicts in the majority of villages involved in the research. Our evaluations show that the majority of WMCs in the village are better functioning than before.

We have achieved our objectives because we thought that it was important to establish relationships with local leaders and strong links with the different communities, enabling them quickly gain population's trust and confidence as well as ability to influence villages decision makers.

The set up of this approach allowed a forum for the community stakeholders, where, for example, the opinion leaders or other member of a specific group can speak openly, and therefore raised their awareness of the problems facing their communities. It also allowed in particular to the women and girls to be involved and participated to the decision making process about the choice of solutions to be implemented or be involved in the WMC. Their attitudes did have a positive effect on the population especially with regard to managing handpumps. Our investigations show that a WMC with women functions very well, thus giving the end-users a sense of responsibility.

Despite the successes of the project the following questions remain. How can we measure the influence of communication activities on a change in behaviour (for example, to the acceptance of women as members of the WMC in a village) ? How do the solutions in the present effect future generations ?

We must continue our investigations and look further into our analyses. Evaluating the effectiveness of each participatory communication activities (tools), such as the meetings and

video documentaries to resolve a given conflict type, to ensure that these methods are appropriate for the resolution of social, technical or socio-sanitation water conflicts.

The experience in the field showed that changing mentalities, habits, behaviours in villages has not been easy. It is necessary to establish a framework for a long-term process to achieve these changes.

We have not yet resolved the conflict over a wife of a village chief refusing to wait in line with other women at a hand-pump. We also have not resolved conflicts about women not being accepted by the men and notables of the village to contribute to decision-making about water use. Women still cannot occupy a position as president of a WMC, but we have to go step by step.

We have learned that meetings, theatrical representations or the other activities of communication that we implemented, were not been sufficient to achieve socio-cultural change. For example the ancestral beliefs or taboos about the hours to collect water, the necessity to pay for handpump maintenance, the necessity to observe proper hygiene practices and drink safe water to avoid the diseases related to water. Perhaps we should work more on the set up of a Village Water Users Association (VWUA), which will manage all water resources of the village. This structure can replace the WMC. This is the type of structure which will make it possible for the population to make permanent the implemented actions and ways to communicate, to discuss, and to exchange views to avoid conflicts.

Four main accomplishments of the project can be mentioned. Firstly, we elaborated a new typology of water conflicts can classified them into three categories: the technical conflicts, the social conflicts and the socio-sanitation conflicts. This facilitates the involvement of all stakeholders to the resolving water conflicts' process using our Participatory Communication Strategy. Secondly, we designed a new model for the Water Management Committee's set up and functioning. Thirdly, we established a link between the functioning of WMC and the presence of conflicts at the villages handpumps. Fourthly our methodology can be transfer in other villages of the Nakanbé River Basin and in other River Basins in Burkina Faso or in other Saharan countries where the water conflicts are occurring around water sources, by adapting it to local conditions.

Finally, we think that all participatory decision making approach must build capability within local communities to expect results over the long run. This should normally allows populations to take their responsibility and autonomy. It is an aspect that had been neglected in our project. To improve our methodology we will integrate this aspect in putting the emphasis on the transfer of know-how to the local communities.

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Table 1 : Sampled villages

Zones :	Villages
Around Loumbila dam	<ul style="list-style-type: none"> • Nabdogo (bordering village) • Goué (located within a radius of 6 kilometers to the reference hydro-system) • Goundry (located within a radius of 13 kilometers to the reference hydro-system) • Silmiougou (located within a radius of 22 kilometers to the reference hydro-system)
Around Bam Lake	<ul style="list-style-type: none"> • Kora (bordering village) • Sorgo (located within a radius of 8 kilometers to the reference hydro-system) • Loaga (located within a radius of 18 kilometers of reference hydro-system) • Sakou (located within a radius of 20 kilometers to the reference hydro-system)
Around Bagré Dam	<ul style="list-style-type: none"> • Bankako (bordering village) • Bagré I (located within a radius of 6 kilometers to the reference hydro-system) divided into eight small villages : Bagré I village, Yambo, Bokla, Patan, Kingalé, Kalakoli, Sanganboulé, Dirlako or Bagré II • Gogninga (located within a radius of 13 kilometers to the reference hydro-system) • Zabo (located within a radius of 22 kilometers to the reference hydro-system)

Table 2: Taxonomy of Stakeholders (Source : Banville and al., 1993)

	LEVEL OF PARTICIPATION	
LINK WITH THE PROBLEM	Take part directly	Do not Take part directly
Influence the problem	Fiduciaries	Invisibles
Affected by the problem	Concerned and active	Concerned but passive
Affected and influence the problem	Standard (Traditional)	Behind doors

Table 3 : Sources of Water Conflicts, Defined Conflicts, Involved stakeholders, Suggested Solutions in six model villages in Nakanbé River Basin

Sources of conflicts	Defined Water Conflicts	Involved stakeholders	Suggested Solutions	Villages
<ul style="list-style-type: none"> ◆ No-respect of water collection schedule ◆ No-respect of water collection round ◆ Few water points ◆ Sociopolitical problems (related to ethnic, religion) ◆ Ancestral beliefs (presence of black pots at a handpump) ◆ Waste of water by people coming from other localities ◆ Outsider status in the village ◆ Lack of proper communication 	<ul style="list-style-type: none"> ◆ Frequent quarrels and Disputes around villages Handpumps 	<p>Between :</p> <ul style="list-style-type: none"> ◆ Women among themselves ◆ Women and girls ◆ Women, girls and young boys ◆ Women, girls, young boys, stockbreeders ◆ Native users and outsiders ◆ Other users and merchants (restaurants owner, beer makers, ...) 	<ul style="list-style-type: none"> ◆ Awareness campaign and vulgarization of various themes related to causes of conflicts ◆ Elaboration of Water Collection schedule ◆ Building (construction) of new handpumps ◆ Repairing of no-working handpumps ◆ Restructuring of WMC 	<ul style="list-style-type: none"> ◆ Goué, Silmiougou, Kora, Loaga, Gogninga et Bagré Centre
<ul style="list-style-type: none"> ◆ Lack of pastoral water points ◆ Lack of water feeding place for animals 	<ul style="list-style-type: none"> ◆ Disagreement about the presence animals at the handpumps 	<ul style="list-style-type: none"> ◆ Stockbreeders and other end-users 	<ul style="list-style-type: none"> ◆ Establishment of pastoral Water Sources ◆ Creation of water feeding place for animals 	<ul style="list-style-type: none"> ◆ Silmiougou, Gogninga

<ul style="list-style-type: none"> ◆ Site approbation by the village chief or delegate ◆ No-consultation of the population about the site location ◆ Undemocratic choice of WMC members ◆ Lack transparency in funds management ◆ Handpump location far from the village ◆ Lack of WMC ◆ Bad hygiene practices around the Water Sources ◆ Problem to access the source of Potable Water ◆ Drinking Unsafe water ◆ Lack of information about the existence of water related diseases ◆ Insufficient Water Sources ◆ Relationship between men and women in water management 	<ul style="list-style-type: none"> ◆ Disagreement on the location handpumps ◆ Refusal to contribute to the handpumps maintenance ◆ Disagreement on the existence of water related diseases in the village ◆ Refusal for marriage due to lack of water 	<ul style="list-style-type: none"> ◆ Village authorities and population ◆ Population, ministry, and village authorities ◆ Donors (Government, NGOs, Projects) and the population ◆ WMC Members and the rest of the population ◆ Non-elected treasurer and others users ◆ WMC Members and population ◆ The other end-users and stockbreeders ◆ Young boys, girls 	<ul style="list-style-type: none"> ◆ Awareness campaign and information about the cause of the conflict ◆ Restructuring the MCWP ◆ Installation of the MCWP ◆ Awareness campaign about the importance of contributions ◆ Awareness campaign and vulgarization of environment hygiene and diseases related to water ◆ Create water feeding places for cattle ◆ Construction of protection Wall ◆ Awareness campaign and vulgarization based on the sources of conflicts and women role in water management. 	<ul style="list-style-type: none"> ◆ Goué, Silmiougou, Kora, Loaga, Gogninga and Bagré Centre ◆ Goué, Silmiougou, Kora, Loaga, Gogninga and Bagré Centre ◆ Goué, Silmiougou, Kora, Loaga, Gogninga and Bagré Centre ◆ Silmiougou
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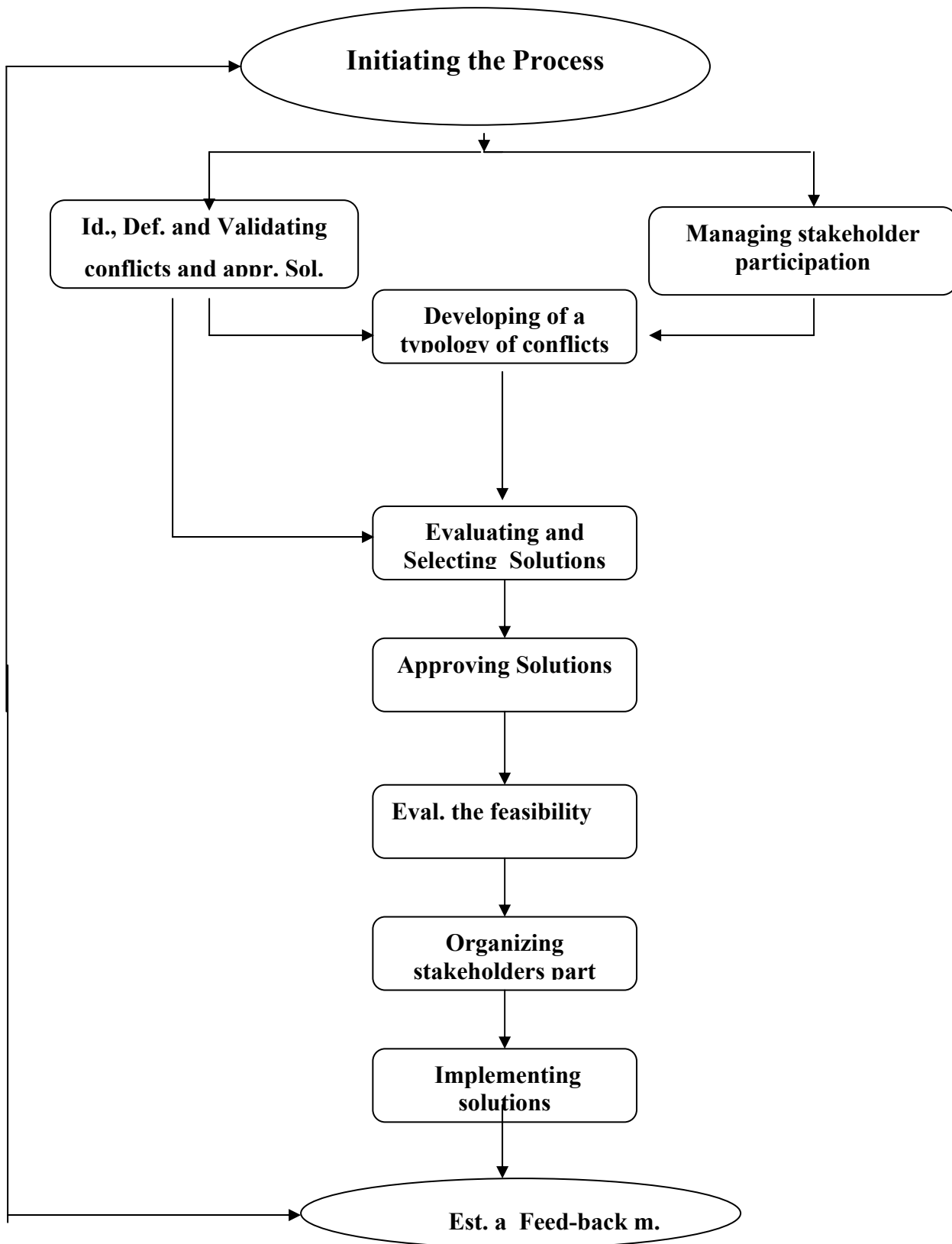


Figure 2 : Methodological Approach of Resolving Water Conflicts

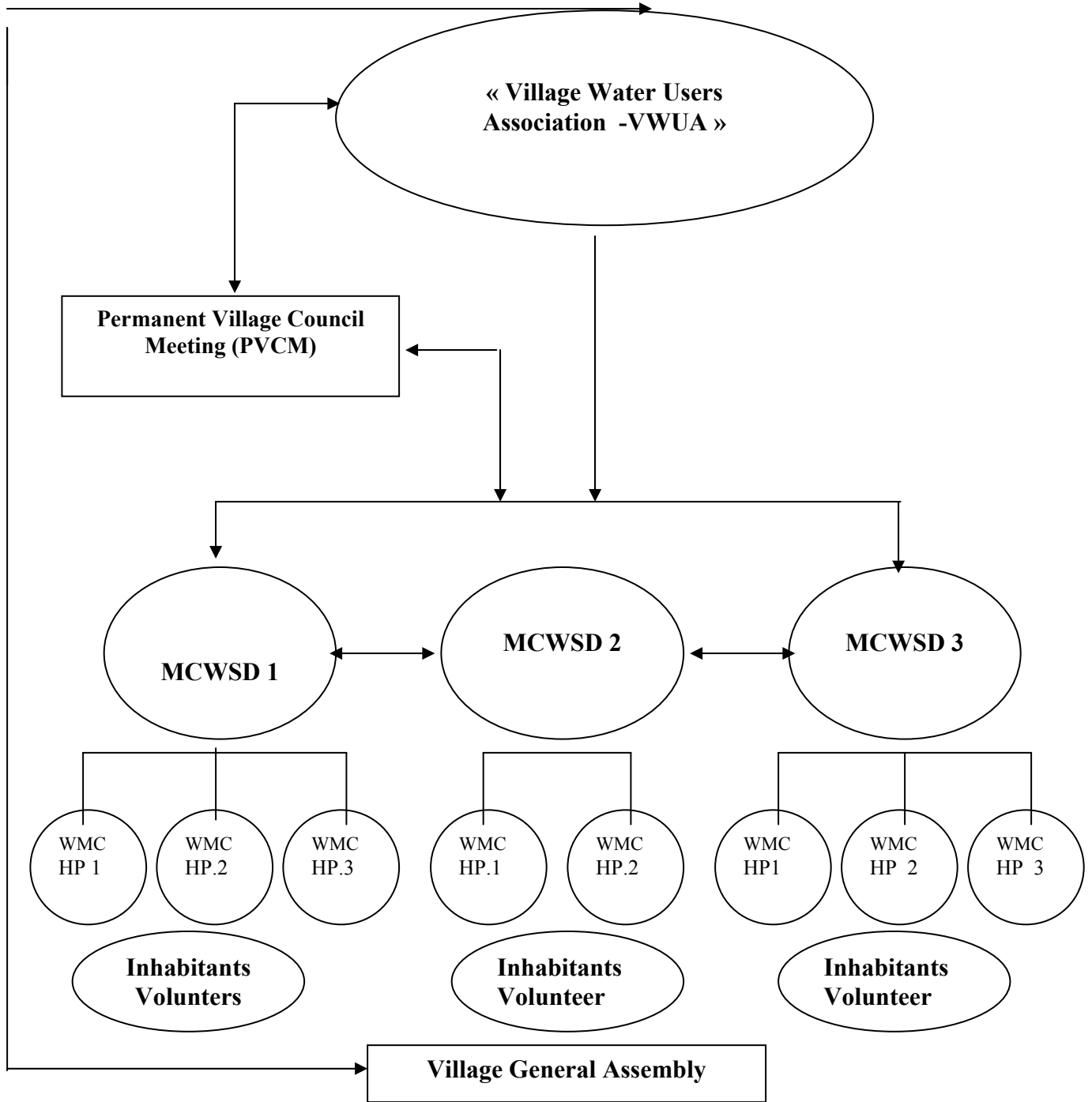


Figure 3 : Installation of the New Model of WMC

