

A Water Users Association in Madagascar : Why does it fail?

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Preliminary version

Abstract

In European countries, markets are well developed and governments relatively efficient to correct their failures. The set of social dilemmas faced by communities is thus relatively limited. In developing economies the opposite is true: missing markets and poorly performing governments leave communities with a much wider range of social dilemmas. This paper discusses implementation of new irrigation systems management in Madagascar which is smallholder rice economy. We particularly focus on the role of farmers in irrigation management and development of farmers' organisation. The government of Madagascar (as many others governments around the world) has adopted a program to devolve responsibility for irrigation management to Water Users Associations (WUA). This reform was mainly driven by government fiscal shortages and its inability to raise sufficient revenues from collection of water charges. Decentralization and devolution of water resources management should increase water user participation in decision-making and investment, and improve management incentives, accountability, agricultural and economic productivity and cost recovery. This development tool is a participatory, bottom-up concept which has received particular attention in recent decades. The major benefit of such a program should be a more equitable water distribution among members regardless of their location, type or size of farm. Moreover, water conflicts could be dealt quickly at local level, and among one's peers if there is a Water Users Association. Other benefits include more water reliability, well-maintained canals, less water theft, and empowerment through participation. The paper proposes an explanation of opportunistic behaviour in WUA that jeopardizes the sustainability and development of its members' welfare (watering crops without paying the water price for example). We determine the actors' group characteristics and effective institutional settings at the local level, such as limited sanctioning and enforcement mechanisms and almost no monitoring mechanisms, that provide the conditions

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for such a behaviour. The study is based on the first results from an empirical field study in Madagascar. The discussion is based on empirical material from Ampitatafika village in the Central Highlands. Effective rules-in-use in local communities are presented. We try to explore the community's capacity to solve such a collective action problem which is critical to the sustainability and development of its members' welfare.

Introduction

Rice growing is an omnipresent activity on Madagascar Highlands and practised by a population mastering agricultural techniques. Irrigated rice growing requires a collective management of water (distribution) and maintenance of the works (dams and canals). However, management of irrigation water which would require the introduction of collective rules such as water turns is still being discovered. Indeed, management system of water, which remained traditional on many perimeters, is at the origin of wastings, whereas a more equitable distribution of the resources would be desirable. This chapter aims at studying the rules of operation and the efficiency of the community system of management of a total irrigated surface of 1 040 hectares, which uses water of the Onive river. This traditional irrigation network, modernized by the French colonial administration during the 50's, was strongly degraded in the 80's. Within the framework of the national program "*Petits Paramètres Irrigués (PPI)*" (Small-Scale Irrigated Perimeters), a project financed by the *Caisse Française de Développement* (French Agency of Development) allowed a technical rehabilitation of the networks in 1991 and the creation of the *Association des Usagers de l'Eau* (Water Users Association (WUA)) in charge of management of the irrigated perimeter.

1 A historical perspective

The origin of infrastructures defines the first rules of management of agricultural water. Thereafter, social and economic evolution can make these rules difficult to respect until the appearance of a new "socio-hydraulics" order (Garin & al [9]). Forms of users' organizations reflect the history of communities through political and administrative changes which marked the evolution of the country. We describe the few stages which preceded the current management system of water in Ampitatafika.

1.1 An authoritarian system

The first official interventions in rice culture date from the dynasty of the kings of Imerina who reigned starting from the end of 16th century [7]. They concentrated on the development of the hydraulic valley of Tananarive, allowing the transformation of the marshes into rice plantations. At the beginning of the 19th century, king

Andrianamponimerina (king of Imerina, 1797-1810) extends the development of the plain of Tananarive and implements the rules of management of water and maintenance of networks. To manage rice policy the king reorganizes the institutions based on the collective work which becomes regulated. Persons in charge for the communities are invested by the king for a special capacity for control and are charged to distribute the tasks between groups and clans. It is an authoritarian system with rules of management of water and maintenance of networks well defined with sanctions for contraveners. This authoritarian policy bears its fruits since, under the reign of Andrianamponimerina, the famines disappear from Imerina.

In this system, the users have a good technical control of the network. The reign of Radama (1810-1824) and its new orientations disorganized this system " *In consequence of the more and more developed use, the water of the rice plantations becomes too scarce for the needs for the inhabitants. This imbalance between the geographical conditions of this area and its economic situation caused clashes between the users of the water of the same river, discussions, fights which required on several occasions the intervention of the administration. Phenomena of this order are not simple discussions between neighbors. It is about the distribution, between inhabitants having all the same rights, of the public richness: water. It is necessary that this distribution is done according to a preestablished payment* " (Carle, [5]). Thereafter, the irrigation systems are controlled technically by the users and the management of water depends on the community (*fokonolona*) which defines the rules of maintenance of the network and distribution.

1.2 The colonial administration

After the Second World war the colonial Administration has enough money to intervene on the networks of irrigation, either by creating them of all parts, or generally by transforming, extending and improving existing infrastructures. "Modern" infrastructures are superimposed on "traditional" infrastructures. The Small Irrigated Perimeters (PPI) are traditional perimeters extended during the years 1950-1960 thanks to the intervention of the Agricultural Department. In the zone of study of the program 4D, the alteration work began in Masoandro in 1955. The principal dam of Ambodiriana on Onive, as well as the principal canal to the village of Ambihomandroso, were carried out in 1958.

" *There was an old man who had all the plains which started to cultivate corn and pistachios. As time passed and he noted the growth of his family, he decided to construct a dam by employing the larger rock. Then he built the canal which arrived to these fields. After that he obtained many harvests and it was very proud, therefore to show its joy it organized a great festival. When the persons in charge for the State saw what it had done, they decided to build canals to irrigate the plains located downstream. They continued the work started by this ancestor and everyone took part. Then the*

cantonal delegate intervened and made a request to the administrator to help people of Masoandro, it was in 1956. Following this request, the State sent geomericians to make the studies and in 1958 French engineers arrived. After, the construction of the primary on canal was undertaken then they made the request to the State for the construction of right canal in 1959” (the President of the WUA).

1.3 State management

During colonization and after independence, perimeters are extended and modernized. The administration sets up a system of management of water and maintenance delegated to the Rural Department. Peasants become the executants. The services of the Agricultural Department have the control of the execution of the tasks of middle importance. They are in charge with management and maintenance of hydro-agricultural perimeters.

After construction of the canals in 1959, the Agricultural Department began management and its employees who built the dam, managed and maintained the canals. *” People did not have a responsibility on maintenance but at that time, men paid taxes and the state was in charge of it” (the President of the WUA).* The peasants thus lose technical control of the network: they carry out maintenance and repair under the direction of the Agricultural Department but are not informed how to manage this new equipment. The State attends its intervention with implementation of a new system of management of the network in which peasants have few responsibilities. The creation of a *”litrage tax”* related to water consumption allows maintenance of the totality of the network by employees of the Agricultural Department. After Independence, monetary participation of users was replaced by a contribution in work. Maintenance of certain portions of the network is carried out by peasants under the directives of the representative of the Agricultural Department. During the first years of operation of the network, all the works of catch are equipped with padlocked winnowing baskets. The network is under control and monitoring of the agents of the Agricultural engineering. For the principal canals, maintenance is made in 1967 by the Agricultural Department. For lateral and tertiary canals, the maintenance work is under responsibility of the users concerned. The distribution of water on level of irrigation sluices and catches is made according to irrigated surfaces. Water resources are then enough and surfaces of irrigated rice plantations can gradually extend.

1.4 Anarchy

The system works well until 1968. In the middle of the 70’s, the insufficiencies of the Agricultural Department cause a degradation of equipments, control of water and the end of the code of management between users (Droy, [6]). Agents of the Agricultural Department always regulate the distribution of water on part of the principal canals

but now monitor the users who open or close valves as they like. More and more of winnowing baskets are destroyed by users and are replaced by more rustic valves. The modification of the socio-political environment related to the installation of decentralized communities leads to a complete disorganization of the management of irrigation networks. With the disappearance of the central authority, collective maintenance, is transferred to the communities and made more or less well. In 1978, the users start to take part in work on request of the *fokonolona*. Thus, any valid man of more than 18 years has to take part in work whether he has or not a land and whatever the surface he exploits (BDPA, [3]). Each *fokonolona* is affected to a portion of the canal, which does not correspond inevitably to the part used by some of the users of the *fokonolona*. The users living out of the mobilized *fokonolona* are exempted of work. Maintenance of canals on a small-scale valley consequently becomes more and more a sum of individual actions. Canals are cleaned episodically. This period is marked by the indetermination of the forms of management and the absence of effective regulation: neither authoritative, official, centralized and effective management, nor traditional Community management but rather "every man for himself and war of water", each one taking the maximum of water available at all the levels. At the end of 80's, anarchy was established gradually and many peasants spend the night to supervise their catches while the brawls multiply. For example, peasants of the downstream in the fokontany of Mahaketraka affirm being deprived of water. The complaints to the higher authorities remained without consequence. The conflicts between users of the upstream served well out of water and users of the downstream lacking water become an event of the everyday life. Consequently, several hectares of rice plantations are left in waste land. As we can see it in table 1 (investigation carried out in October 2003 in the rural district of Ampitatafika (1621 households)), the weak control of water causes difficulty in many peasants of the zone concerned since more than 60% of them suffer from the lack of water as well for the lands located in plains as those located in *tanety* (uplands). Moreover, problems of floods relate to nearly 78% of peasants questioned during the Investigation reference 4D. Water, source of any agricultural activity, and essential to rice growing is thus at the center of problems since finally few individuals are saved by the lack of water or the problems of floods. Half of the individuals admit being constrained in their agricultural activity by irrigation difficulties.

2 Transfer of irrigation management services

2.1 Madagascar - irrigation rehabilitation project

Madagascar has adopted a participatory and progressive approach towards irrigation rehabilitation. Under this approach, they have a legal transfer of management respon-

	Water shortages (plains) (%)	Water shortages (<i>tanety</i>) (%)	Floods (%)
Yes	65.6	61	78.3
No	29.6	35.7	19.1
Not concerned	4.1	3	2.6
No answer	0.7	0.3	-
Total	100	100	100

Table 1: Water shortages ans floods

sibility for irrigation operation and maintenance of all sizes and schemes. The national project of rehabilitation of the small irrigated perimeters began in 1985 with two objectives: - technical repair of a total surface of 90 000 hectares installations irrigated between 1986 and 1995; - the installation of Associations of Users of Water, one by rehabilitated network. The State left weakened this reform and associations of users installation very quickly. The process is divided into three phases¹

2.1.1 First Phase

Regional Government irrigation staff visit schemes and explain the official policy for the irrigation sector, which is based on Government withdrawal from all irrigation operation and maintenance and transfer of this responsibility to water user associations. This policy applies to all donor interventions in the sector, which are integrated within a "national irrigation rehabilitation program".

After proof of motivation and if water users request it, the project finances an NGO or a firm to assist the water users in grouping themselves into an association (or associations) and in determining the nature of works to be carried out in order of priority. The project will finance an engineering firm to carry out a technical and feasibility study of irrigation rehabilitation. The water users (in conjunction with local government authorities) are involved all along this process and sign off on the report of the firm.

During this first phase, the water users association (WUA) is organized and legally established. The new WUA then determines the requirements for annual maintenance in terms of manual labor and monetary contributions. In this first phase, the project will fund some urgent works, as identified in the study and agreed with the water users. The contribution of water users to the cost of the total works should not be less than 20%.

¹source; *INPIM*: International Network on Participatory Irrigation Management

2.1.2 Second Phase

While the first phase emphasizes the establishment of the WUA, the second phase focuses on implementation of physical works. As in the first phase, the water users have to contribute to at least 20% of the estimated cost of the total works. Contractors are hired for the works that are not easily carried out by water users (headworks construction, excavation of large canals and drains, etc), while the water users work on smaller canals and drains.

The NGO or firm continues to work with the association and to bring home the message of the need for everyone to contribute to the costs of maintenance. Again only if the recovery of *O&M* (operation & maintenance) fees remains high does the project proceed to the third and final phase.

2.1.3 Third Phase

In this phase, final civil works are carried out to ensure that the irrigation network is fully operational to the satisfaction of the association. The legal transfer of ownership, which is under the responsibility of the Agricultural Department, to the association takes place during this phase. The annual maintenance costs for the network are determined by the association themselves and are presented to the Annual General Assembly for approval.

The NGO may remain for some time to assist the association after this phase. Similarly, the Government irrigation services remain to provide technical advice to the association. The "transfer of management of the irrigation" is the passage of the responsibility and the authority of the management of the public organizations to private associations, such as the users' associations of water.

2.2 Role of water users associations

Government agencies cannot or do not want to manage the irrigated systems any more. They are trapped in the vicious circle of the low covering of the fees by which increased deficits of exploitation and defective service do not encourage the users to pay their fees. Empirical studies conducted during 80's having shown that the farmers are able to sustainably manage systems irrigated on a small-scale rural community and that the community organization is even often the most effective mode of the organization, the agricultural policies evolved to the formation of entities gathering the users to manage the networks of irrigation. The agricultural policies preach a decentralized management of the irrigation by Water Users Associations with financial autonomy and technical responsibilities for maintenance and management for the networks. One of the motivations of many projects of irrigated installations was the "participation", trying to integrate the point of view of the users in the technical design of the hydraulic equipment and thus to obtain an increased adhesion of those with the objectives and

viability constraints of these infrastructures. In the field of the water management, this participation is also justified by the fact that users, because of their proximity, would be most capable to solve daily problems of the use of water and to make joint efforts to face Community dysfunctions. The participation means consequently a complete engagement in all the operation of the system of irrigation: stock management, the decision-making process of the new investments and the rehabilitations, decisions on the structures and functions of the users organization.

In order to make the peasants responsible, the Malagasy State attends its disengagement by setting up operational organizations called "Water Users Associations". The covering of maintenance and operating costs, the exploitation of the irrigation networks and their maintenance are transferred since the Agricultural Department towards the WUA. The financial contribution of the users relates to two quite distinct stations, on the one hand the contribution for the operation of the WUA which is used to pay the expenses of the board and on the other hand the provision for operating expenses and of maintenance which is called "royalty" and is calculated in proportion to the surface exploited by user. But the transfer of management is difficult and a certain number of problems appear because associations are stakes of capacities. On the PPI Onive, only one association called Famokarana Iraisana ("collective cultures") was created on July 28, 1991 with nine groupings based on the level of *fokontany* whose main objective is the take of responsibility of the maintenance work on the canal so that the system is functional and satisfactory. This association had been preceded since 1988 by creation by a federation of the users on the initiative of delegated of the nine *fokontany* concerned with the network and whose objective aimed at the equitable distribution of water and the coordination of work necessary to the maintenance of the stopping.

According to the law on the WUA and their standard rules of procedure, the leaders of association have the responsibility to ensure the maintenance of the networks and the management of water, in particular by the definition of the water turns in period of shortage. Association is recognized officially as the institutional interlocutor who represents the users, and its board of directors counts a member of the local government of agriculture. This one continues, during the launching phase, to provide various technical supports. This new entity which is the WUA comes to be superimposed with the political powers and social already existing and there is consequently a risk of monopolization of the structure of operation by the rich in order to divert the objectives of association to the detriment of an equitable distribution of water and a good maintenance of the network. The principles of the imposed associative model are new rules which can be in opposition with the rules and the modes of collective action and management of the capacity in force.

The collective assumption of responsibility of the networks is long and difficult because the operation of the WUA requires a strong social cohesion, which does not exist any more.

2.3 Ostrom's principles

The various field surveys undertaken in the world indicated that there is never the same set of rules. However, general principles are respected in all the viable organized systems in the long run. Ostrom [14] identified eight principles which seem to be checked in all the systems posting a certain sustainability.

- Clearly defined boundaries - in the irrigated system, the limits of the lands being able to profit from water, the individuals or households which have rights on water, are all two the clearly defined ones. In Ampitatafika, the individuals know indeed the lands which belong to the supposed PPI and consequently individuals being members of the WUA to have access to water.
- Congruence between appropriation and provision rules and local conditions - there is not congruence of the rules i.e. adequacy between the mode of calculation of the royalties and the quantities of water obtained, however factor of success. The contributions are fixed. Although initially the fixed rules were those of an amount and an availability of water in proportion to cultivated surfaces, they seem that these rules were never respected. This causes a certain misunderstanding on behalf of the peasants cultivating smallest surfaces or not obtaining necessarily the sufficient quantities of water.
- Collective-choice arrangements allowing for the participation of most of the appropriators in the decision making process - the majority of the individuals concerned with the operational rules belong to the group which can modify these rules. Initially, one had chosen an associative structure, with a "democratic" process allowing to control the various sources of being able, with a threshold of representation and a process of vote allowing to satisfy the greatest number. In the fact, the WUA is directed by the same president since his creation, whose capacity is called little into question. The office is not inactive but remains subordinated to the strong personality of the president. There are few elections in the groupings, the majority of the groupings heads "are indicated" during the meetings.
- Effective monitoring by monitors who are part of or accountable to the appropriators - those in charge to supervise and to control the network and the behavior of the irrigants are accountable to the users and/or are the users themselves. In order to operate supervision and monitoring, of the polisin-drano ("police of water"), members of the WUA, are charged to supervise the good distribution of water and the good respect of the procedures. Unfortunately, these polisin-drano who play an ambiguous role, located between that of the guards of the discipline of the users, guarantors of the protection of the infrastructures, and that of the aiguadier, charged with ensuring the distribution of water between the pieces

often lack competence. In fact, since the WUA is not equipped with catch to ensure the management of one or more secondary catches, there is often nobody to manage the water which circulates inside the network, apart from the principal catches. Thus, too often, water is distributed to the upstream, whatever the real needs, causing wastings, whereas the downstream of the network suffers from the shortages.

- Graduated sanctions for appropriators who do not respect community rules - the users who do not respect the rules must incur sanctions. They must be differentiated according to the gravity and depending on the context of the fault and be decided by the other the responsible users, agents in front of these users, or both. The internal rules of the WUA include clear sanctions against the contraveners, sanctions whose application is often failing, which causes a loss of authority of the WUA. The cut of supply water as dissuasive measure is very often difficult to apply and technically impossible if that concerns only one individual. The WUA does not apply the *dina* (rules of procedure) of which the application is placed under the responsibility of the members of the board, supported in that by the *polisin-drano*. This for several reasons, initially a preoccupation with a social propriety: "*One cannot force a member of his family to pay*" or "*It is not easy to apply sanctions because its application will create hatred towards me*". Then, nobody wants to be responsible, even if everyone knows the author of the infringement. The problem of non-payment of contribution which perdure already for several years has seemed to worsen. This one comes mainly from the discouragement of the peasants with respect to the authority and owing to the fact that the bad debtors are never worried "*Those who follow the discipline could be discouraged by seeing those which do not work to be entitled to water and not be sanctioned*".
- Conflict-resolution mechanisms which are cheap and easy of access - the users and their employees have a fast access to authorities local, inexpensive, to solve the conflicts between the users, or the users and the employees. In case of conflict, the president of the WUA is called as a mediator but this conflict-resolution mechanism is quite imperfect. Moreover, the legal way is a not very realistic option due to the high transaction costs. The recourse to the police, the court or other means of coercion is the best way to attract the hostility of the peasants.
- Minimal recognition of rights to organize - the right of the users to invent their own institutions is not questioned by external governmental authorities. The transfer of the responsibility for the management of the networks is a process which goes against the institutional practices of a centralizing State.
- Organisation in the form of multiple layers of nested enterprises, with small, lo-

cal CPRs at their bases - the activities of appropriation, regulation, monitoring, control and sanction, resolution of conflict, direction, etc are organized on multiple levels and inter correlated. There still, the omnipresence of the president returns this type of very difficult operation.

2.4 Problems

Beyond the technical adjustment of the network, the degree of control of water depends on the collective organization for the distribution of water, for example compliance with rules of water turns and social discipline. In short and long term, it also depends on a good maintenance of the irrigation network, itself function of incomes drawn from the production and from cohesion as well as the motivation of the users to assume the costs (monetary or collective working time). Lack of water and fight against water stealth impede good management of water around the canal. Here, not only certain farmers deplore the effect of the lack of water on their production, but it develops a climate of conflict between the various users of water. One then observes a certain indiscipline and individualism seems to reign on the mode of management of water, while the general state of the canals degrades . Thus, on our zone of study, a third (32%) of the heads of households recognizes the existence of conflict on the management of water (Investigation Reference 4D).

There are no more rules which are essential on all. Everyone does what he wants, i.e. people who are upstream canal block water as much as they want it and those which are downstream obtain their shares only at the time when there is much water (a user, member of the WUA).

The physical modification of the distribution of water requires a redefinition of the resource sharing which causes multiple stakes and questions around the appropriation of water, the redefinition of the rules of irrigation, the redistribution of the capacities within the system of irrigation and the representatives of the State, etc. The external intervention can thus be the occasion to found a new resource sharing, on the basis of another legitimacy and of new imposed rules.

The institutional design - i.e. the definition of a set of rules - is crucial in the success of such a project (Mathieu, [13]). Its objective is to change the behavior of individuals, by creating positive or negative incentives. The incentives depend obviously on the values shared by the actors. Thus, an individual with a great sense of equity will invest himself more readily in activities which will bring a better collective distribution of water. Incentives to respect the water turn must be stronger than incentives to irrigate its land immediately. However, the change of the formal rules does not always have a direct impact on their application and thus on the incentives. The current difficulty of the WUA to provide their services and to solve these problems is related to multiple factors among which factors related to the social context of their implementation. Initially, one can mention sociological and organisational problems:

- Absence or weakness of bases of social cohesion, probably because of noncoincidence between the technical units to manage (very wide network) and the social and residential units (small dispersed hamlets).
- Heterogeneity of users on the same network which includes poor small farmers having kept the traditional modes of culture and big landowners.
- Inclination of the members to delegate all the powers to the persons in charge which makes them very dependent on the latter.
- Conflicts between individuals and families.

Then, the users do not understand the technical aspects of the operation of the works nor the way in which they could benefit from it. The lack of comprehension is related also to the traditional practice to take too much water compared to the needs for rice. Lastly, one notes a frequent lack of communication, at the same time between the members of the board of the WUA and between the users members. In the perimeter, the problem is all the more complex that the number of the users is significant.

Thus, any intervention of development influences the processes of collective action and leads to the implementation of new rules or procedures managing the relationship between individuals. This is even true since there is a common resource to manage, for which the actors are in competition as it is the case for water in an irrigated system. The intervention presented here generated at the very least debatable results, perhaps because of the too great importance granted to the construction of the works versus institutional affairs, because of a certain idealization of the "Community" . As Mathieu [12] underlines, technicians seem to have neglected the dimension of collective action, by supposing that the Malagasy peasants have great experience of water management and would manage without too much difficulties the water turns. Also, they supposed associations of users being responsible for the management of water and it will be their problem, and not the technicians', to apply the "social discipline". This mode of intervention led to the creation of structures whose rate of profitability is generally low. The question of perennality remains outstanding.

3 Norms and behaviors

From the point of view of institutional economics, an institution is a set of rules used by a social group to organize actions having effects on these individuals (Platteau, [16]). These rules will be observed only if they are legitimate and if the authorities which have the sanction and supervisory powers are also legitimate (Plante, [15]). Every social group has its own rules and its institutions charged to implement them or to sanction any distance of the norm to which the members of the group are supposed

to conform. As Bon [4] indicates, the behaviors known as "opportunist" reappear since the probability of being sanctioned drops in on this side certain threshold. The various possibilities of withdrawing oneself from the local and legal sanctions threat the viability of the existing local forms of organization, and contribute to create the local conditions of a free access to the resources. Local management and social control are consequently possible only in a context where the individual actions have a strong probability of being detected by the group. One could suppose that in the context of a nonanonymous rural economy, as it is the case with Ampitatafika, the social and economic cost of non-compliance with the rule is sufficiently high and stigmatizing so that the opportunist behaviors are not also recurrent. Then why does one observe a so weak adhesion with to new rules of management instituted by the WUA? One can suppose that there is finally no cost to derogate from the rule within the framework of the division of water or that this cost tends to decrease with time.

3.1 The *fhavanana*

According to Fauroux [8], the Malagasy rural communities built around the family community worked out an allowing set of solutions, thanks to the reinforcement cohesion and solidarity, to improve the capacity of resistance of the group. The model of the social relations corresponds to the concept of *fhavanana*, "ideology solidaristic" having for function to move the social competition in domains not blaming the reproduction of the life. The "powerful one" in this type of community, is not the one who consumes more than the others, but rather who contributes more to the various expenditure caused by the game of the social relations.

The *fhavanana* is a moral rule of control which recommends harmony and mutual aid towards its family, but also between two families, two villages, even two ethnos groups. It underlies the interpersonal and social relations and makes it possible to control the possible social differences that could occur as well as of the family origin, so that each one has the feeling of membership to the group, as an active member of the life of the group in which it has a statute recognized well of all. Each birth, circumcision, wedding, exhumation are the occasion of ceremonies which reaffirm the solidarity of those who take part in it. The contributions of each one are made in the form of money and of paddy (rice), they have at the same time a character of blessing towards the family and participation in the expenditure. The individual feels the need for sacrificing his own interest for the benefit of the community. This process of internalisation of the social norm is never perfect, and mechanisms of reward and sanction are necessary to supplement the role of rituals and education. Severe sanctions are sometimes carried against individuals having sought their interest suitable for the detriment of the group. The fear of public humiliation plays a significant role.

However, the image of a homogeneous "traditional community", levelling, undifferen-

tiated, must obviously be very largely called into question and Fauroux [8] dissociates the concepts of solidarity and equality: the ideology of the fihavanana is solidaristic in the sense that it institutionalizes the redistribution of the total product between all the members of the group but is uneven insofar as this redistribution creates and maintains the radical differences of prestige. Those who hold the economic capacity dominate the social one and impose their ideas. The big landowners draw the attention of the agricultural work force towards activities which are with their advantages.

3.2 Cultural perspective

According to Hugot [10], the values of harmony which have a long existence within the Malagasy rural communities do not exist in the particular domain of the sharing of irrigation water. One of the explanations of the difficulties encountered by the WUA would be in fact that water sharing can not be based on solidarity. This one indeed seems to be reduced when the vital interests are threatened and a considerable proportion of the individuals act contrary to the enacted rules, i.e. does not pay their contribution or takes more water than it is authorized. Water seems to represent a very particular case within the Malagasy rural communities since because of its scarcity, it appears to the villagers that anyone cannot have enough of it, whatever the organization. The mutual aid, in such a situation, would consequently become unfavourable for all and the consequences would be too serious. In this particular case, the habits of solidarity do not apply anymore, the strictly individual motivations taking the step on collective interest.

There is not enough water, and each one tries to have what he needs at the expense of the others - There cannot be agreement for water (peasant quoted by Hugot, [10]).

They are interdependent to lead water up to the point where one irrigates. They made a dam and a canal themselves, without assistance, but to irrigate, they do not want to be organized. There is no more no solidarity, for the water pipeline. - (peasant quoted by Hugot, [10]).

3.3 Institutional perspective

One second explanation of the difficulty of making people comply with common rules would come from erosion of the social norm, i.e. of a weakening of the cohesive power of the fihavanana. Consequently, following an egoistic behavior which can lead to the diversion of the common goods is perceived more by the individual who profits from it like an insurmountable cost. The causes of this evolution can be multiple: intervention of the outside which weakens social cohesion; opening to the market economy which provides income other than agriculture revenues; migrations. These factors led to a change of mentality. In this context, not sanctioned deviating behaviors tend to spread

until disappearance of the social norm. Like Bon [4] notes, "*it is not the fact that a small number of individuals derogate temporarily from the norm and compromise the realization of the collective effort which is prejudicial, but the appearance of deviant behaviors, not sanctioned, which contribute to question the institution itself in the medium term, opportunism becoming the norm*". Didn't the substitutive interventions of the Agricultural engineering, as it ensured a regularity in the water supply, destroy capacity of the individuals to manage this resource as well?

Conclusion

Although the concepts of Community identity and feeling of mutual dependence can sometimes encourage the existence of a Community management of the resources, it is not because all the villagers benefit from the collective actions that they will always comply with the rules of the game (Baland & *al.*, [2]). The individual strategies and behaviors are defined in the daily and personalized relations between water users. Reduce behaviors known as "opportunist" is then a central problem for irrigated systems. In many cases, and in particular in rural communities, social rules shared by a community precisely aim at limiting this type of behaviors. However, if the rules organizing the irrigated system are not accepted by the participants, there will then be no sanctions for those which violate them. If the formal structure is perceived as illegitimate, the behaviors which threaten perennality of this structure will not be rejected.

This is why, when central agencies try to impose the same rules on all infrastructures, those are likely to fail if:

- they are not adapted to the specific situations;
- they are perceived as "external" from the participants;
- the local norms of behavior are not mobilized.

When peasants do not take part in maintenance work or do not pay their contribution, the stake then becomes to prevent them from benefitting from the work of the others. If free-riders are not sanctioned, then less and less peasants are ready to make maintenance, and opportunist behaviors are likely to spread and lead to a general degradation of irrigation network. Conversely, when peasants are assured that the advantages are higher than the costs, that these investments are necessary, and that the majority of users will take part in it, they often cease being free-riders and invest significant quantities of work.

The establishment of a local authority controlled by the users of the resource themselves and equipped with a sufficient capacity to be able to sanction the violation of the rules does not seem an easy approach. Indeed, the practices continue to exert their

influence and if the authority is formed by the users, they can be reticent to sanction the illegal actions in every day practice and to show indulgence in the cases observed of noncompliance with the rules.

We must be a little more severe on the application of sanctions (a person in charge for grouping).

In such circumstances, to call upon an external mechanism of implementation to initiate a new convention based on new waitings and beliefs seems the only realistic solution.

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