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Title

**Interstitial areas, externality and local solidarity
The Sagara ravine case, Burundi.**

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Topic n°36 : **Local government and the management of common property resources.**

Résumé

L'effort de l'Etat pour la conservation des sols au Burundi porte au niveau de la parcelle paysanne, réputée former un système, et consiste à rejeter à l'extérieur le surplus d'eau de ruissellement. La réunion de ces eaux, hors des champs privés, sur des terrains très pentus, produit des ruissellements puissants au niveau des chemins et des rigoles entre les appropriations. Ces rigoles se développent en ravines aux dépens des parcelles adjacentes ou situées en aval. Ce réseau de rigoles et de ravines forme un espace grandissant et interstitiel qui a toutes les caractéristiques d'un espace commun en accès libre. Les riverains peuvent en avoir tous l'usage, il permet au niveau de chaque exploitant de régler le problème du surplus d'eau.

Quelle est l'analyse la mieux adaptée pour aborder la question de l'érosion linéaire au Burundi ?
Faut-il une analyse en terme de système de culture et d'effets externes ou une analyse des espaces communs et des institutions qui leurs sont attachées ?

Summary

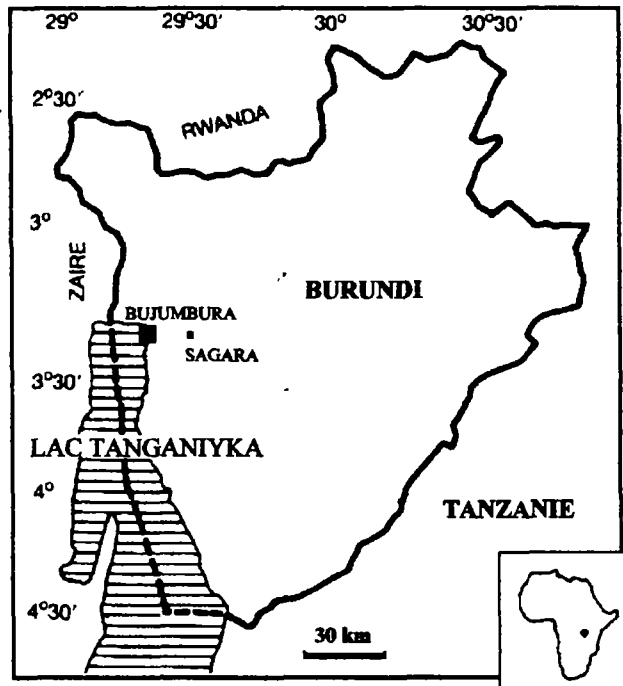
The government's strategy for farmland soil conservation in Burundi, is dominated by a representation of farming system as an independent entity. So the tendency is to channel the water out of the individual's farm. This runoff water gathers between properties and begins to erode the soil, creating a larger common space between the farms in form of a ravine. This common space can be used by anyone to evacuate surplus water.

What is the best way to evaluate the linear erosion problem in Burundi ?

Is it to analyse farming systems and external effects ; or is it to reflect upon this new space as a common pool and are the related institutions able to manage it ?

I. The Sagara ravine: a trans-appropriative phenomenon

Sagara hill is located in a region called Mumirwa on the western slopes of a mountain chain upstream of Bujumbura, the capital of Burundi. The main characteristic of this agro-pastoral region, where population density is high (500 inhabitants/km²), is the shortage of space. Farms are very small and unequal, those exceeding 1 ha being considered as large domains. Most farms occupy around 0.4 ha. Even smaller plots, ranging from 0.1 to 0.3 ha also exist. Here, farmers have no choice but to exploit the most steeply sloping land, most severely affected by soil degradation, leading them gradually towards social marginalization (COCHET, 1993)



MAP OF BURUNDI

Private land linked by ravines

The land surface appears to be entirely covered by private farms centred around the farmers' dwellings. Dwellings are surrounded by a banana plantation mixed in with trees and small coffee plots, while tilled crops (beans-maize) are located further away. Cassava fields occupy the steepest slopes (sometimes 100% ¹) furthest from the dwelling while other crops are grown on slopes averaging 60%. This landscape is structured according to the slope; some fields are crossed by erosion-protection lines and isohypsic paths (perpendicular to the slope), while other paths follow the direction of the slope.

Rainwater from roofs and fields collects on the paths where it forms rivulets when it rains. The water collected from several paths forms channels and then ravines. The network of channels and ravines crosses properties and sometimes cuts through them.

From the hill to the town

These channels, sometimes deep and narrow, can grow rapidly wider, causing substantial damage to several properties located down the slope, destroying roads and causing problems at a regional level. Materials carried off from the slope are deposited in the Ntanhanga river, causing flooding in Bujumbura when the river bursts its banks.

¹A 100 % slope means that the angle of slope is 45°

II. Zones between properties: externalities or interstitial areas?

Agricultural land, the result of man's action on the physical extent of the soil, can be observed in two ways. from afar, i.e, from a geometrical point of view or from a topocentric point of view at the farm level:

From afar, the observer can clearly distinguish, in this densely populated region of Burundi, two unequal types of land use:

- relatively large areas, divided into private properties, comprising dwellings, banana groves and fields marked out by hedges, trees or ditches
- much smaller areas, located between the larger ones, sometimes occupied by a small path or channel, for which appropriation is not exclusive and which appear to fill the spaces between the areas of private property. We will call them "interstitial areas". These interstitial areas have a wide range of uses. water drainage, pathway, source of forage and wood and property boundaries.

From the point of view of an observer standing inside a property, these interstitial areas are located outside the agricultural property, they constitute the environment immediately adjacent to farms, but which do not belong specifically to any neighbour. These areas are also a consequence of the way in which private farms are operated, since people need to have access to their fields (presence of paths) and to drain off excess water from their land. These interstitial areas can thus be analysed as externalities linked to the running of the farm.

A. Linear erosion and externality

1 *The notion of externality*

An externality is an "external diseconomy", an adverse effect on one or more economic actors resulting from the acts of other actors (SAMUELSON, 1972, p 148). This notion has been used by fishery economists to describe situations where the objective interest of a single fisherman becomes contrary to overall or social interest². When the fish reproduction capacity is only slightly higher than the total capturing capacity³ of all fishermen, any decision by any one of them to increase his fishing activities will lead to a reduction in the resource. As the fish become scarce, the marginal costs for all fishermen will increase. Individual interest may go against collective interest and lead to a catastrophe, such as the disappearance of the resource for everyone.

The behaviour of farmers in Sagara who discharge excess water down the hill results in damaging to the farms and collective property located further down (diseconomies). Since all farms interlock

² This contradicts the conventional theory, according to which the decisions of each individual actor lead to a social production optimum (Pareto optimum) which guarantees equality between the product's market price and its marginal social costs.

³ number of boats, net size, etc

with and surround each other, the repeated passage of people along the edge of fields results in trampling and preferential flows which cause problems for field owners. These micro-phenomena are causal factors in the creation of the ravine and can be analyzed as externalities of normal farm operation.

2 *How are externalities dealt with?*

Economic theory proposes making use of market mechanisms to modify the behaviour of actors in favour of greater environmental protection. Be it the polluter-payer principle, with contracts authorizing pollutant emissions or transferable exclusive usage rights for a renewable resource, the principle is the same: the aim is to internalize external effects, i.e., to bring the private marginal cost to the company or individual in line with the marginal social costs by distributing taxes or property rights on resources or an equivalent in the form of pollution rights. This idea is underpinned by the utilitarian model ⁴ and defended by supporters of the merits of the market and of the generalization of private property as a means to protect the environment (FALQUE, 1984)

The utilitarian and individual model is not universal but a product of western societies. Twenty years after the launching of the polluter-payer principle, its implementation in OECD countries is still slow and difficult since "the real economy is not an economy of perfectly flexible markets" (HENRY C, 1993). Solutions other than those that rely solely on the modification of behaviours through the market must also be considered, since "behaviours of reciprocity and respect for rules transcending individual interest may play a significant and beneficial role in protecting the environment" (idem).

Behaviour with respect to the environment or a renewable resource depends firstly upon the representations of nature shared by the group (WEBER, REVERET, 1993). The representations of nature, linked to the system of values specific to the society, correspond to what Elinor Ostrom calls "constitutional choices" (OSTROM, 1989). On the basis of these shared representations of nature, management of the resource as a common asset becomes possible; erosion protection measures can be decided collectively (collective choice) and operating rules respected by individuals in order to achieve the objectives set (operational choice) (idem). Management as a common asset is a global point of view which includes the interstitial areas in the system. In our view, it is a way of dealing with externalities which is well suited to trans-appropriative phenomena.

3 *How should it be applied to the Sagara ravine?*

The use of financial incentives to modify the behaviour of those living close to the ravine is not, in our view, an appropriate solution, since farming in Burundi is not monetarized; individual behaviour depends more on relations between neighbours, exchanges ⁵ in the form of gifts than

⁴the more others contribute to a collective asset, the less an individual is inclined to contribute himself

⁵Beer is a unit of exchange. It is presented as gift, accompanies words or rituals and creates networks of solidarity. The gift of a cow established links as strong as kinship bonds

on market mechanisms.

Technically speaking, individual responsibilities for the development of the ravine would be difficult to evaluate, since ravining is caused by a concentration of water flow and is typically a phenomenon of interaction between the combined practices of a number of people.

Moreover, it would be expensive and controversial to set up a system to measure externalities

The notion of externality says nothing about the actual nature of the areas between properties, as we will see in the next chapter

B. Nature of interstitial areas

When the ravine grows, the space it occupies can no longer be used by its initial owner.

1. Things or disutilities

When speaking of goods, we will refer solely to things which are a source of advantage and which are covered by individual and absolute rights (Carbonnier, p 90 and 133; Le Roy, 1994 p 8).

According to modern law, which distinguishes solely between things (*choses*) and goods (*bien*), public and private, the ravine clearly lies in the public domain (refer table below). In this context, the area which may be a source of damage is a thing. In economic terms, this thing which grows and destroys private property provokes disutilities.

Table 1: Things and goods in western societies
(according to Le Roy, 1994)

	Thing (<i>choses</i>)	Good (<i>bien</i>)
Public	Public domain	Private domain
Private	Communal	Private property

2 What land tenure?


In practice, this ravine is not managed by the public institutions and its legal inclusion in the public domain remains theoretical. It is not named or clearly identified; it remains "interstitial", i.e., it occupies an area between properties, an empty space.

This changes when the ravine carries away, for example, a section of the main road, which is a public good, whose maintenance is the responsibility of the Ministry of Transport and Public Works. In this case, the existence of the ravine is recognized and the problems it causes are handled by this ministry. However at this stage, it is too late and the necessary measures to control the ravine, by now very large, raise considerable technical problems. The technical services simply deal with the regular damage to the road without treating the actual cause, located further uphill. And it is simply very tempting to accuse the farmers of neglect.

This framework of analysis is too narrow to take into account of reality. The area of the ravine, while it remains relatively narrow, is accessible only to those living nearby. In practice, it is therefore not really a public area since access is limited to certain groups

As the ravine enlargers, the group of affected farmers gets bigger. Initially, and particularly at the top of the hill, the ravine is used by farmers to discharge excess water. This usage is equivalent to an asset over an area which is neither private or internal ⁶, but external; it constitutes priority control shared by a few groups, situation (1) in the table below.

Table 2. Land tenures:
modalities modes of regulation of relations between man and the land,
according to the theoretical framework proposed by Etienne Le Roy (1994, p. 7)

Land tenures	undifferentiated (thing, "chose")	priority (asset, "avoir")	specialized (possession ⁷)	exclusive functional ownership	exclusive and absolute ownership
Public	3				
External	2 	1			
Internal					
Private				4	5

Over time, in the downhill part, the ravine widens, damaging adjacent areas which may be in

⁶ "That which is common to all, groups or individuals, and with open access, is public; that which is common to certain groups and accessible to those who share control is external, that which is common to a single group or community, with access determined by membership of this group is internal; that which is specific to an individual or legal entity is private" (Le Roy, 1994, p 6).

⁷ Possession is the exercise of specialized control over a thing which may have a number of uses or several different successive uses.

situation (4) or (5). It produces disadvantages and becomes, for the farms affected by its growth, an external thing corresponding to situation (2). When an area of coffee plants is swallowed up by the ravine, it moves suddenly from a situation of exclusive private ownership (good, 4 or 5) to the situation of undifferentiated external ownership (thing, 2). Finally, when the ravine begins to affect the public domain, such as a road, it becomes the responsibility of a State organization and hence a public thing (situation 3). We can see that the ownership of the ravine can evolve from situation (5), exclusive ownership, to situation (3), a public thing

The current legal situation of these areas does not take account of the diversity of contexts. Legally, the State should take responsibility for all channels liable to turn into ravines. Practically speaking, this is not realistic, since the State does not have the necessary resources

3. *A common thing*

Henri Ollagnon (op.cit.) makes a simpler distinction between three types of appropriation of a resource according to the decision-making processes applied to its management: private goods, collective goods and common goods. For private and collective good management, there is unity of decision and action; for the former case, the decision is made by one physical person and in the latter by a collective or legal entity (State forest management services, association, etc.). Conversely, for the management of common goods, several decision-making units apply a common management strategy.

Since the ravine is a thing managed by several decision-making units, it can be qualified as a common thing.

III. The case of the Sagara ravine (Mumirwa)

A. A context of recent land colonization and shortage of space

Agricultural colonization of the Mumirwa hill slopes began in the early 20th century under European incitement. However, today, population density has reached 500 people/km² ⁸. Previously, all agricultural activities and populations were situated on the high plateaux of the eastern slopes of the Zaire-Nile ridge ⁹, the western slopes being used as pasture land only. The land was said to belong to the king. Management was collective but there was no open access to land since one of the king's main roles was to redistribute usage rights for this land (CHRETIEN J.-P. 1993; BOURDERBALA, 1993; GUIZOL, 1994). The king acted equitably and his decisions were strongly influenced by the assembly of wise men who were able to contest royal decisions (RUTAKE P., 1992; GAHAMA, 1983). Nothing much is left today of these collective lands in

⁸ According to the 1990 census, the annual population growth rate in the Sagara hill region ranges between 4 and 6%, compared to a national average of 3.05%.

⁹ This mountain chain, part of the African rift, forms the division between the Zaire and Nile river watersheds.

the Sagara region since the "king's lands" become State lands; in the 1970's and 1980's this land was reforested by the Water and Forestry Department, thus giving them the status of private State land. This gradual phasing out of usage rights was carried out without any consultation between the inhabitants and technical services, which led to an undercurrent of confrontation with the farmers over land occupation (COCHET, 1993; GUIZOL, 1994).

Land occupation on the Sagara hill is therefore recent and since the highly sloping terrain is very different from that worked by Burundi farmers on the plateaux for many centuries, they were taken by surprise by the problems of erosion. The history of the ravine has been reconstituted with the help of inhabitants of the hill (DUCHAUFOUR et al., 1993)

B. Erosion dynamic

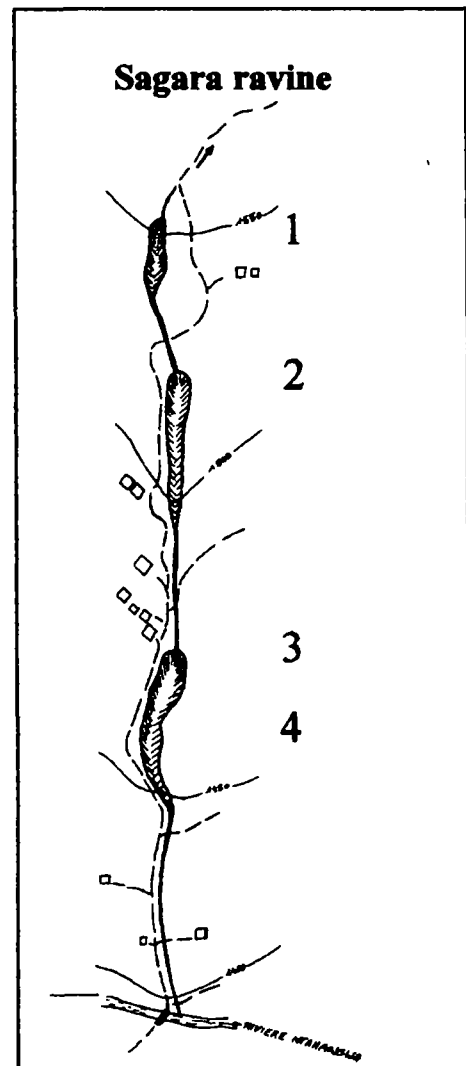
The ravine appeared in 1961 during a particularly pronounced rainy season. It channelled its way along the path down the hill which. At that time, there were only four houses, though by 1991 their number had increased to 24. The first major trench, one meter in depth, appeared in 1973 and grew progressively until its dimensions stabilized in 1978. But that same year, another trench appeared just below the first, which in turn stabilized in 1982. A third trench began in 1983 and a fourth in 1985. Between 1985 and 1991, this final section grew to a width of 10 meters and a depth of more than 10 meters over a distance of 250 meters.

For the first fifteen years, the farmers did not worry about the problem; the ravine was growing deeper but not wider.

C. The technical management difficulties of trans-appropriative phenomena

When the widening ravine started to bite into private land, farmers took action by throwing stones into the bottom of the ravine and strengthening small natural sills. Indeed, erosion in the first two trenches was stopped by the presence of a few trees left standing by inhabitants and by natural quartzite sills.

But erosion had already reached a scale that could no longer be dealt with effectively by local inhabitants. In 1985, they called upon the local authorities who, in vain, turned to the State services for help. No State authority took on any action. the Ministry of Agriculture is responsible for farmers' plots in the private domain, but ravines are outside; the Ministry of Rural Development deals with improvements in the private habitat and spring tapping, the Ministry of Public Works works in the public domain and hence any ravine located between



private properties do not come under its responsibility, this Ministry will not look into the problem until it affects a main road. In a system of sectorial action, it is very difficult to find anyone willing to deal with trans-appropriative phenomena (OLLAGNON, 1989, BAROUCHE, 1989).

D. The engineer's approach

At last, on an experimental basis, the *Institut des Sciences Agronomiques de Burundi*¹⁰ began rehabilitation work in 1991. On the basis of a diagnosis of water flow in the ravine¹¹, the approach adopted was to propose and implement solutions governed by two technical considerations: flow rate reduction and limitation of bed load transport.

Rehabilitation work comprised of :

- stabilization of the ravine bed by the installation of micro-hydraulic dams,
- planting of vegetation on the banks and over a protected area around the ravine,
- recovery of roof water in collection tanks.

Certain areas along the ravine which could no longer be used for cropping were expropriated by monetary compensation. The work was performed by inhabitants paid by the project. Inhabitants neighbouring the ravine were expected to contribute to subsequent maintenance work.

This experiment demonstrated that with moderately costly techniques the ravine could be stabilized and, even better, the "lost" areas could become productive once more after a certain time (production of forage, bamboo, wood, certain crops, etc.).

E. The limits of the engineer's approach:

The project had to intervene several times to carry out maintenance work on the sills, since this was not performed locally. Recommendations were not respected, despite compensation, and one farmer¹² had started growing crops again on the edge of the ravine. The approach adopted by the project does not guarantee effective management over the long term, since it takes inadequate account of the relations between people with regard to the ravine. A large number of questions were not settled

- who is to pay for the recurrent management costs (sill maintenance, ravine surveillance, etc.)?

¹⁰ Supported by the PRPE (projet de recherche pour l'environnement) of the Coopération Française.

¹¹ The hydraulic study provided an estimate of the drainage rate at 210 l/s, 20% of water coming from metallic roofs, 40% from paths and ravines and 40% from cultivated fields.

¹² This farmer has 17 children and two wives to support. Cropping on the edge of the ravine was motivated by necessity; but this shows that no organization with power to control the ravine emerged after the operation was completed. If this had been the case, a certain solidarity between farmers could have been developed to maintain the ravine.

- who is to enforce the rules? what sanctions should be applied to those who transgress?
- who is to pay for supervision costs?
- how are the usage rights for resources in areas around the ravine to be shared out?

The decision-making procedure based on a technical diagnosis by bringing in solutions from outside, destroys any solidarity between the people directly affected and encourages them to wait for other projects to bring paid work and to maintain the protective structures

The technical approach does not result in viable rehabilitation reproducible on a local scale, since it is not based on existing local structures for management of social relationships.

IV. From an interstitial area to local negotiated management of a common good

Since the approach of the State and of projects leads to failure, should the ravine be privatized and its management handed over to a farmers' association?

A. State or local organization management ?

1. State debt and reluctance to accept responsibility

Even prior to the series of bloody events which have shaken the country since the assassination of President Ndadahye in October 1993, and setting aside the current political situation, the State of Burundi does not have the resources needed to deal with erosion problems in the rural environment. The State debt amounted to USD 1034 million in 1992 ¹³, and 90% of this debt is the result of development aid provided in previous years. In 1992, debt servicing represented 31% of the country's export income.

Hence, the tendency in the early 1990's regarding development policy was to call upon privatization and community self-promotion ¹⁴. The message is clear: the State can no longer be relied upon to provide a certain number of services which, until recently, were supplied free of charge or at very low cost.

2. Weak local authorities

If the "local authority" is defined as the interface between the central administration and the population, such authorities existed in the past in Burundi. Central power was represented by

¹³Debt totalled USD 100 million in 1979 and USD 600 million in 1986; in 1992, 46% (USD 473 million) of this public debt was due to development aid from the World Bank, with debt from all bi- and multi-lateral debtors amounting to USD 943 million in 1992 (Sauvain and Uvin, 1994).

¹⁴ Construction of schools by the local population and local authorities is an example of what the Burundi authorities call "self-promotion".

royalty, with the king representing the unity of Burundi for all its people. Indeed, no "ethnic wars" occurred in Burundi before the 1960's. The king's authority spread over an area in which the population shared the same basic social behaviours and he was backed up by a two-tier administration with a territorial base: the chiefdoms and the sub-chiefdoms.

Outside the royal domain, which occupied a small share of the territory, the king rarely intervened in the management of chiefdoms. The sub-chief was closely supervised by the chief; he was no more than a local delegate. The chief appointed the sub-chiefs from among local notables. The status of local notable (*mushingantahe*) was reserved for men whose worth was recognized by the population. A new notable would be officially appointed at a ceremony in which he undertook an oath to serve the community and settle all conflicts equitably.

Hence the sub-chief, a notable recognized by the entire population, was well placed to act as intermediary between the royal administration and the people. The sub-chiefdom was the level which connected the people to the central power: a local authority thus actually existed at the time where the king held power.

The period of Belgian supervision modified the balance of power between the *Hutus* and *Tutsis*, increased the size of local administrative districts, reduced the power of the *bashingantahe* (singular *mushingantahe*) and marginalized the role of the local authorities. This breakup of the old system continued after independence, with the successive republics: the administration is kept in tight rein by the central power and duplicated by a single, obligatory party, structured right down to the hill level. Local authority is no longer trusted by most of the population and is by practice, disappearing.

3. *Calling upon local organizations*

Although now the State is calling upon local organizations to take charge of development in its place, Sauvain and Uvin (1994) note that such organizations are very few in number. The disappearance of local authorities and the single-party regime which, for thirty years, suspected all types of associations, provide, in our view, an explanation for this. Among the local organizations allowed to exist (church groups, cooperatives, user committees, etc.) the most active in the hills are still the self-help associations and church groups.

4. *Local self-help associations*

We will describe the self-help associations, which take two forms.

- *Ugufashanya* is a self-help association among family or neighbours; an occasional association of a small number of people to build a house or to work in the fields. This type of association is tending to disappear due to the monetarization of work and land and the social tensions¹⁵.

- *Ishirahamwe*, is a wider, more frequent, more structured and more flexible type of association.

¹⁵ The shortage of space leads to an individualization of households and social tensions.

It always brings together people enjoying good social relations and is often based on kinship and neighbourhood relationships. Its purpose may be, for example, to buy and cultivate jointly a plot of land, though the contributions of members may differ (one provides the plot, another the manure, another the selected seed, etc.). Some of these associations may be market-oriented, pooling money to buy, process and sell a particular product (banana, beer, wood, cassava, etc.).

5. *Conflicts regulation on resources usage*

Conflicts within the association or between individuals are settled by the institution of notables, comprising the wise men recognized by all (*abashingantaha*). These associations which are still being practised in the hill level¹⁶, are in charge of land tenure and solving resources conflicts. In case of failure at this hill level, the unresolved matter can be brought to the communal administrator, who like the former chiefs, is consulted as a superior authority. If it remains unconcluded, only then can the case be brought to a modern tribunal

B. Beyond interstitial area: from a negative thing to good

1. *At local decision level: towards an efficient control and harmony with nature*

Technically, the phenomenon of linear erosion reoccurs easily and rapidly. When the ravine becomes too big, large-scale engineering work is needed to control its development and reparations are hefty. The problem is one of prevention rather than cure, i.e., to act as early and as high up the hill as possible. So, a regular inspection and control is necessary.

At the early stage, it is the local farmers whose properties are crossed by the network of channels and paths forming the watershed of the ravine, who would be the first informed of the ravine dynamics, thus the best and assured surveillance would be one made by the ravine dwellers.

The effectiveness of this preventive action is also in the interest of the State (see below § C3). Thus, the aim is to give to the locals (in this case the farmers along the ravines) the responsibility for a common thing which unless controlled may have adverse effects especially for those who are situated further downhill.

Local decision is therefore more appropriate. Decisions must be coordinated from up to downhill and the decision itself cannot rest on an individual. This means that an assembly of ravine dwellers is needed to analyse all aspects of the problem and agree on the required actions.

2. *Transforming the negative thing in the productive area and solidarity*

Once stabilized, the foot of the ravine stay moist and the soil is rich as it benefits from deposited materials transported down from uphill. This area is of course productive (bamboos, forages, wood, bananas, etc.) However, the management of this area has to be subjected to the rules of usage to avoid the reoccurrence of linear erosion.

The usage has to preserve the vegetation cover by maintaining the rugosity which is essential to

¹⁶"Hills level" means in Burundi a very local level.

decrease the flow velocity of water by breaking its force. Wood cutting and foraging are allowed as long as the vegetation are not weeded or destroyed. The sills must always be well maintained and the ravine edges should be kept green; allowing usages like coppicing of eucalyptus but none that could involve tilling or weeding activities. **On these areas, where there is ravine control, absolute private ownership is simply not possible.**

These productive interstitial areas are the last site where solidarity among farmers can still take place. Indeed, what would be the reasons to associate if, without land nor money to be shared, everyone has only his's own labour force to offer?

C. Negotiation on common good

1. *Basis of the negotiation among ravine dwellers*

There is no uniform group which can be formed by the people living nearby, among those who suffer the effects of the ravine and those who do not. Ravine control needs a set of rules which must be respected by everyone. These rules can differ from up to downhill; users from the uphill are more obliged to reduce the runoffs whereas in the farmland along the ravine, it is necessary to impose restrictions on usage rights. This implies a supposition of willingness on the part of the dwellers to respect these rules voluntarily

This agreement on a common set of rules can be achieved because of common objective to avoid the recurrence of damages and also to get a new production land. But the strenghtening of relationships between families and neighbours is the strongest possible reason for these inhabitants to find a common agreement.

2. *A negotiation of downstream dwellers right up to Bujumbura*

The ravine is located inside a large watershed which is situated upstream of Bujumbura. The strong overflows which come from this watershed and cross Bujumbura bring materials which damage the city; destruction of bridges and roads, floodings, deposition of mud inside industrial areas.

In actual, impact of the ravine management covers an area far larger than Sagara hill. The control of linear erosion is to the interest of the city dwellers. The negotiation concerning erosion control of the ravine should include them; but it is clear that most of these city dwellers are not even aware of the existence of Sagara ravine

3. *The need of the State*

The State has many valid reasons to intervene with the negotiation of the ravine management :

- to represent the city dwellers' interest,
- as public goods manager (bridges, roads, etc.)
- to guarantee to the ravine dwellers some exclusive rights on resources coming from interstitial areas as long as they ensure the maintenance of the managed ravine.

The state can also intervene by giving technical supports (technical diagnostics)

4. *A patrimonial management of the ravine*

A precondition to the ravine management is to change its representation from a negative thing to a good, from an interstitial area to a productive land. This means building up among the people a common feeling that they belong to the same land, what Ollagnon call "patrimonial sentiment"

Creating a "sentiment patrimonial" between the society and the ravine imposes most of the decision making process at the local level and the recognition of solidarities between up and downstream and also between the city and the outskirts. The real actors must be brought closer to the negotiation arenas by creating, for instance, an assembly of ravine management which would held at the local level. In this assembly, for practical reasons, the city dwellers can be represented by a state officer.

A patrimonial negotiation on a renewable resource is designed to allow the people to express firstly, their different interests in order to come to a feasible agreement on a common representation of the resource. Only with this representation can a common long term objective be seek. Any discussions to find technical solutions should be postponed until after this agreement on a long term objective is decided

The patrimonial negotiation is a procedure for legitime decision making, in the case of complex situation like trans-appropriative resources management

V. Conclusions

The ravine transforms private and collective areas into a thing. Thanks to the experience acquired in the Sagara ravine, we know that technically a thing can be changed into a good, since the bottom and edges of the ravine can become productive, provided all inhabitants living close to it have the same long-term objectives for ravine management and take the necessary steps to limit water flow. Due to the trans-appropriative character and the multiple uses of these interstitial areas, management as a common good appears to us to be the most appropriate solution (§ IIA).

The need to intervene very early on, as soon as ravining begins, requires very close local supervision of erosion and harmony with nature. For these reasons the local level is the most suited to the management of interstitial areas (§ IIB).

In spite of the failure of long-term ravine management by bringing in technical solutions from outside (§III), we do not think that "privatization of the ravine" provides a good alternative as a solution. By its very nature, the ravine links inhabitants above and below it, and beyond it the road users and city dwellers of Bujumbura; the State cannot handle everything, but it must at least guarantee the safety of collective infrastructures (road, bridges, etc.), and to that extent has an interest in the way the ravine is managed. The State can provide support to the locals, for example, in the form of technical diagnostic assistance, but, above all, by guaranteeing exclusive usage rights over the resources in the interstitial areas

Negotiation between the State and locals, who do not have an equal position with respect to this ravine, appears to us to be an essential prerequisite for its long-term management. In this

negotiation, the State would represent both the inhabitants of Bujumbura, who are unaware of their links with the ravine, and the legal entity responsible for the country's infrastructures.

The notion of interstitial area has the merit of naming the thing, and recognition is the first step towards action. It is not only water that passes through these interstitial areas; they provide numerous services (passage, wood and forage production, etc). Through management of common resource, interstitial land can be the site of a new kind of solidarity

But the local rules in uses for common pool management are not known enough in Burundi. In the forestry sector, good concepts on common resource are sadly lacking. Forest replantation, managed by the State, occupy large tracts of land which are much needed by the locals. In addition, wood supply for home use are prohibited from these forests. On the other hand agroforestry, which could be extended as a common pool resource, were nevertheless, conceived only for private owned lands. This clearly indicates that foresters did not take into account under-privileged agro-pastors/farmers (whose lands measure less than 0.3 ha) who were also forest users. Now their livelihood depend on these interstitial areas for foraging and wood supplies. Therefore there is every need that these interstitial areas be managed as a local common pool resource.

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