Contribution of Participatory Mapping to the Implementation of Local Politico-Economic Projects: Experience of a Rural District of Mali

The domination of local and customary authorities in the implementation of local socio-economic activities and in the processes of decision-making, in general, is increasingly challenged, long before the formalization of decentralization policies in West Africa began. In addition, several agents and institutions involved in local development argue in their speeches for the participation and empowerment of the grassroots populations in decision-making. The "ordinary citizen"[*] is invited to play a greater role in the development of basic socio-economic policies and in the processes of territorial construction. However, in our context, the institutional powers struggle to cohabit with the traditional powers continuously building a big gap between these different powers and grassroots populations who aspire to greater transparency in local development policy processes. Local spatial knowledge and its products, such as maps and other data collection tools, are put forward to contribute to a better involvement of the grassroots actors in the political and economic management of their territory. Our experience in the rural district of Alafia (Timbuktu, Mali) focuses on an articulation of participatory processes and good governance with technologies related to geographic information. It proposes a methodological protocol for supporting local actors based on the "maps to say actors" (MSA)[†] and computer-based techniques. The study involves the organization of a permanent activity of data collection and participative management of spatial and territorial information to help better formulate the territorial problems that arise and to integrate ideas on the various situations. In addition, it aims to provide some answers to the following questions:

- How to involve "ordinary citizens" in decision-making in the face of the powers held by local and customary authorities?
- What are the constraints in developing knowledge, methods and tools from participatory processes, which we hope will contribute to improving the territory management?

Keywords: *Participatory Mapping, GIS, Local Development, Participation, Mali.*

Introduction

In most developing countries, the decision making is centralized and lies sometimes at the top level of the State. Very often, the traditional knowledge of the communities in the planning of development projects is ignored and not taken into consideration. Therefore, development institutions and researchers have initiated methods and designed tools in order to involve these

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[*]The "ordinary citizen or " simple citizen" refers here to the population not in charge of decision-making.

[†]Maps drawn by local people that will serve as the basis for the implementation of the entire GIS.

communities in territorial decision-making and enhance their know-how. In these planning approaches, the use of local geographic knowledge is very often highlighted. However, the articulation of the concepts of participation and good governance with technologies linked to geographic information is itself an area whose application remains complex and often controversial. This paper attempts to shed light on this articulation, at least in its aspect of aid to the territorial decision.

State of the Art

Active research and participatory planning approaches with local populations were born out of two main findings[‡]. On the one hand, several projects are generally set up and piloted by external "experts", starting from studies based on rather theoretical hypotheses with weak and inconsistent diagnoses and, on the other hand, the results of these experts are not always adapted to the environment and often lead to inappropriate recommendations. These approaches have imposed themselves since the 1980s as a new paradigm of development and research intended for the rural world, particularly in the countries of the south. But, with the advent of policies linked to decentralization, they are taking on a new dimension today (Gueye, 2000) which takes into consideration the empowerment[§] of local populations.

One of these modern approaches is the Method of Rapid Analysis and Participatory Planning (MRAP), which is based on taking into account local knowledge. It is presented by its promoters as being a real revolution for rural areas. It is a set of approaches and tools used to allow local populations to present their situation and their living conditions for themselves. It establishes a communication process closer to the actors and allows them to be consulted directly on the perception of their local realities. It is supposed to be more significant than the indicators proposed by the so called "experts".

For its implementation in the field, specialists such as (Krichewsky,2000), (Pretty,2000) and (Delvile et al, 2000), recommend the use of maps produced by the local actors themselves from their geographic knowledge to establish a real dialogue between them and the populations concerned. This use of spatial representations from local actors and GIS tools is also mentioned by (Joerin, 1997), (Joliveau et al, 2000), (Peribois, 2005) and (Maurel, 2005) to facilitate negotiation in participatory projects, which concern the territory and its challenges. They showed how these geographic tools could help lift the lock on the low involvement of citizens and the involvement of local actors in territorial planning processes.

[‡]PSEP : Methodologies et Approches ; http://portals.wi.wur.nl/ppmefr/?M%C3%A9thodologies_%26_Approches

[§]It is indeed the will displayed by all the local communities surveyed to be involved and participate in everything related to the management of their land. This desire to empower those who are far from decision-making centers is an integral part of the objectives of PMIS.

1   However, although unanimity around the importance of participation and
2   the tools that accompany it seems established, the achievement of the
3   objectives and practices of participatory methods is still mixed. In addition, the
4   methods of applying these methods remain a field of enormous risks due to the
5   great complexity of understanding the different issues and the culture of the
6   actors involved. Indeed, these approaches do not really address the substantive
7   questions that revolve around the issues and difficulties related to participation;
8   namely, on what? Where? With whom? At what moment? And how do we go
9   about giving rural communities a real spirit of negotiation and real decision-
10 making weight?

11   It is in the face of all this questioning that the use of local geographic
12 information in participatory approaches has led researchers to other forms of
13 geographic information technology; namely, Participatory Geographic
14 Information Systems (PGIS) and Participatory Mapping. These are intended to
15 be a significant step towards supporting territorial planning through the
16 integration and representation of indigenous knowledge in spatial management
17 tools. They use many qualitative techniques, such as map sketches, photos or
18 oral traditions, to allow communities to formulate their knowledge about their
19 lands, forests and other resources.

20

21 *Participatory Mapping: Support for Territorial Participation*

22

23   Participatory Mapping (PM), which is the foundation of our experience,
24 has been subject in recent years to intensive research by geographers,
25 sociologists, agronomists, ethnologists, etc. The objective remains the same
26 despite the diversity of territorial contexts. It is based on using the spatial
27 knowledge of the inhabitants, according to their vision, as a tool of planning
28 and facilitation of dialogue between them and the other territorial actors.

29   Participatory mapping, one of the starting points for Participatory
30 Geographic Information Systems (PGIS), began in the 1960s with the Inuit
31 autochthone people in Canada and Alaska. It combines today the use of tools
32 such as Geographic Information Systems (GIS), satellite images and
33 participatory approaches. Its fundamental principle (Giacomo, 1995) remains
34 the conduct of the entire process by local communities.

35   In this area of stakeholder maps, we limit our references to the work of
36 (Casti and Yonkeu, 2009) regarding their experience of Arly National Park and
37 the Gobnangou Cliff in Burkina Faso linked to the culture of the populations
38 living in the areas and the research of (Burini, 2008) who was interested in
39 qualitative and quantitative data from maps produced by Peulh transhumant
40 herders from Niger. It is worth to mention also the work of (Hirt, 2008) among
41 the Mapuche in Chile, which raised the problem of the ambiguity of intentions
42 and objectives sought by Western authors by concealing the specific
43 cartographic techniques of the local communities.

44   We will also cite the experience of cartographic self-conception by the
45 local population of Thieul in Senegal, conducted by (Touré et al, 2000), in
46 order to anticipate crises and help decision-making in local development

1 policies. The work of (Clouet et al, 2001) in Brazil, which uses zoning
2 according to the territory actors and the valorization of community knowledge.
3 Finally, the research findings of (Gata et al, 2008) in the Democratic Republic
4 of Congo, (Mésochina and Shéhou, 2009) in the Central African Republic and
5 (Rambaldi, 2010), who is the pioneer of participatory 3D modeling. His book
6 describes the guiding principles and the applications of participatory
7 cartography.
8   Although we have taken the above references as a basis for our experience,
9 a specific approach was imposed on us due to the economic precariousness of
10 our study area and our concern to avoid the ambiguity raised by (Hirt, 2008)
11 about the use of non-native technologies to produce actors' maps.
12
13 *Some Cases of Participatory Mapping from Our Study Area*
14
15   The local population in our study area, especially the peasants, believe that
16 their traditional knowledge and skills are under-valued, poorly represented or
17 even overlooked when designing development planning plans on their territory.
18 Several development partners have understood this logic and are initiating
19 support tools and approaches based on the use and promotion of local
20 geographic knowledge. They go as far as to link the effectiveness of local
21 development actions to the capacity of communities to develop projects
22 developed and negotiated with the population. Among these initiatives, we can
23 cite that of the International Fund for Agricultural Development (IFAD,
24 2009)[**], which has provided, in its strategic framework for poverty reduction, a
25 component on participatory mapping of rural areas entitled "participatory
26 mapping and good practices. There is also work on participatory mapping in
27 the Timbuktu region by (Laurent, 2005) who was a volunteer of the French
28 Association of Progress Volunteers (AFVP).
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31 **Presentation of the Experimental Municipality**
32
33   The present research focuses on the regions of northern Mali, which are
34 part of the large family of Sahel-Saharan areas weakened by climate variations
35 and changes. The vastness of their territory, their isolation and their severe
36 poverty dangerously jeopardize the success of economic and security activities.
37 Despite the ever increasing development aid and the creation of dedicated
38 structures, such as the Inter-State Committee for Drought Control in the Sahel
39 (CILSS), adequate solutions to the vicious cycle of food crises could not be
40 found. One of the reasons, according to some speeches remains a deficit of
41 implication of the local actors.
42   The rural commune of Alafia (Fig. 1), located about 20 km from the city of
43 Timbuktu, Mali, was created by law number 96-056 under the responsibility of

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[**]Participatory mapping and good practices, 2009: Study prepared for the International Fund for Agricultural Development (IFAD).

1   the Tombouctou region. With an area of 27,857 km2,   Alafia constitutes 8% of
2   the area of the Timbuktu region.

3

4   **Figure 1.** *Location of the rural commune of Alafia in northern Mali*

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8   **Methodology**

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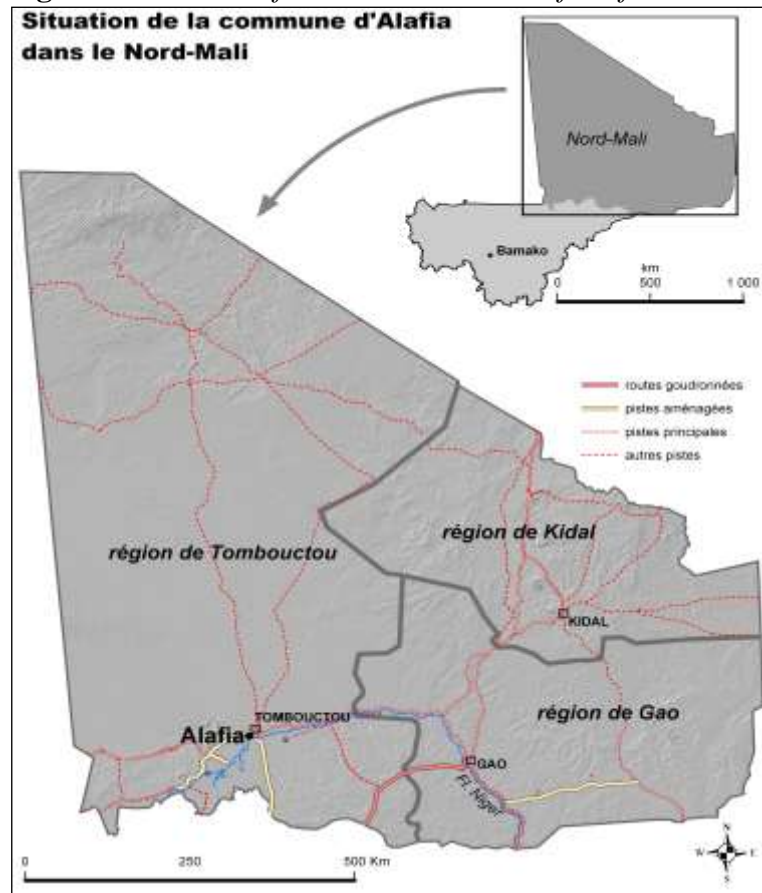
10   It is a participatory mapping approach based on zoning of actors to support
11   a dialogue about issues of power and local development. The purpose is to use
12   and make available the local spatial knowledge necessary for regional planning
13   agreed between the different stakeholders. It consists of co-producing, during
14   multiple participative workshops, of actors' maps that relate to the socio-
15   economic and political dynamics of villages and fractions[††] from local spatial
16   knowledge, which will then be digitized and placed as such in a GIS.
17   The basic principle is therefore to integrate the stakeholder cards, from
18   participatory workshops, in a GIS without modifying them; what we would call
19   "the reference to the local hypothesis". Technically, this involves creating a
20   database with two parallel and corresponding spatial representations: one in the
21   form of graphic objects from the participatory map and the other in the form of

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[††]Nomadic entity equivalent administratively to a village in Mali.

1 raster or vector geographic entities in a classic GIS, which organization must
2 be thought of (see Fig. 2). The idea is to decompose the image of the actors'
3 map according to graphic entities, some of which can under certain conditions
4 be transformed into geographic entities, sufficiently well located and defined to
5 find their place in a GIS correctly georeferenced and topologically valid.
6   The PGIS constitutes the system as a whole that integrates both procedures
7 for the preparation and preservation of delocalized maps in paper format and a
8 procedure for storage and computerized updating of geographic entities. All
9 these elements would allow planning structures to reflect on planning
10 priorities, identify problems of coherence and conflict, build support conducive
11 to consultations relating to planning and occupation of territories.
12
13 **Figure 2.** *Process summarizing the transition from actors' cards to conventional*
14 *GIS*
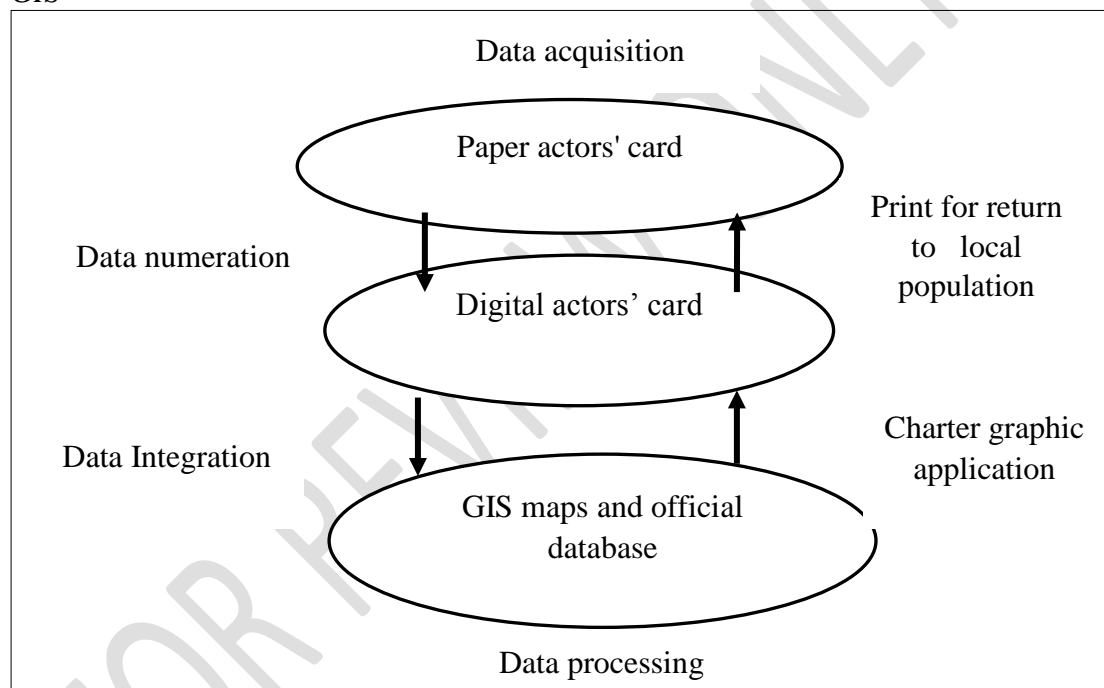
17 *Mobilization of Spatial Knowledge in the Municipality of Alafia*

19   Based on the analysis of the geographic and socio-cultural configuration of
20 our study area, our approach for holding the workshops was organized in two
21 distinct phases: (1) a preparatory stage to deepen the knowledge of the field
22 through a better understanding of local socio-cultural logics and to collect good
23 data and (2) the actual organization of the workshops during which the
24 participants will make the diagnosis, analyze the data emerging from actor
25 cards and formulate development proposals (Fig. 3).
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1 **Figure 3.** *Participatory mapping session in Houndobomo (Source: Ag Dalla,*
2 *2008)*

3
4
5 <u>Preparatory Phase of the Workshops</u>

6   The preparatory phase of the workshops is the longest and most tedious in
7 terms of political, social, technical and financial aspects. The first actor met
8 was the mayor of the municipality of Alafia, who lives fortunately in the urban
9 municipality of Timbuktu. After giving his approval and his adhesion to the
10 program, he convened a meeting extended to all the village chiefs and fractions
11 during which the importance of our work was the subject of long explanations
12 and discussions.

13   During this phase, which took almost two years, we followed the
14 movements of the populations, including those that are not directly
15 accessible[‡‡], such as youth groups, women and men of caste[§§], in order to know
16 the subjects that are conceivable for discussion with each group and at the right
17 time. It is also important to monitor, revitalize and continually animate the
18 networks previously constituted by regular visits, often accompanied by
19 material incentives [***] to maintain the mobilization and obtain broad

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[‡‡]In our study area, society is very stratified so that public speaking is often subject to very strict rules.

[§§]It is like the blacksmiths who, although free, can only express themselves in the way decreed by the chiefs.

[***]Sometimes we contribute financially or materially to our focal point or the heads of villages / fractions in the organization of meetings.

1   participation in the final workshops. The task among the nomads is more
2   difficult because it is necessary to constantly adapt to their transhumance
3   points which vary according to the seasons.
4   We understood also that it is not possible to speak with actors in general as
5   if it were a homogeneous group. Indeed, if they display an agreement at first
6   glance, it proved to be simply a facade during the various meetings. A focal
7   point and a timeframe of activities have been established in each
8   village/fraction by consensus. The procedures, dates, selection of participants,
9   modalities and logistical conditions required for holding the final workshop
10   were also formalized with them.
11   The debates were run by the chief of the village or the fraction at the level of
12   each entity. The consultations led to the selection of a set of significant
13   contacts listed in the table below (Table 2).
14
15   **Table 1**. *Structures encountered in the rural municipality of Alafia (source:*
16   *AG DALLA, 2010)*

Structures	Number	Number of participants
Council of Village/Faction/ Neighborhood	21	214
Socio-Professional Associations	12	36
Economic Operators	19	19
Resource Persons	25	25
Other	17	17
Total	105	311

17
18   Holding of the Workshops
19   A permanent follow-up and a continuous reminder were maintained
20   throughout the week preceding the scheduled dates of the final workshops.
21   Elected politicians, administrators and technicians were voluntarily omitted to
22   participate in these final workshops so that the cards obtained reflect as much
23   as possible the opinion of the grassroots communities. The participants were
24   voluntarily allowed to use their traditional techniques and tools to materialize
25   information and geographic objects relating to their territory or to support their
26   spatial remarks on the models (Burini, 2012)[†††]. We politely intervene during
27   the discussions, from time to time, to balance the talking time distribution so
28   that all points of view are taken into account, especially those of women and
29   youth.
30   The participants prefer to map particularly the areas where a partner's
31   investment has been successful. On the other hand, the villagers do not want to
32   see their "secret places" generally related to their traditional practices, such as
33   places of prayer for rain and offerings for the best harvests and crops.
34   Negotiations, exchanges and debates were often very stormy, around the
35   drawing matrices spread out on a large mat surrounded by the participants, to

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[†††]Frederica Burini in his article on the Chilean Indians believes that it would not be normal to want to contribute to strengthening the use of local knowledge and the citizenship of local populations and impose on them cartographic tools entirely foreign to their culture.

the point that we are forced to use our social relationships and enough tact to mediate power relations (Fig. 4). At the end of the session, uncompromising diagnoses as well as consensual solutions and recommendations are often formulated and several scenarios are considered.

Figure 4. *Cartographic workshop in the village of Iloa (source: AG DALLA, 2011)*

Results and Discussions

Main Results

We are going to discuss two main results, which are each carrying several sub-results that have a positive impact in the construction of the development planning tools and in the implementation of dialogue and negotiations between the different territorial actors. The first being the acquisition by local actors of planning tools for their territory and the second is the establishment of some kind of a "Palaver Tree". The "Palaver Tree" is a well-known Sub-Saharan African expression, which designates the places of discussion forums where all local actors can express themselves, discuss and negotiate freely for the benefit of a participatory democracy. However, we are not going to ignore the simple and effective management practices that we learned from local communities in the exercise of their daily activities.

This type of management is far from being homogeneous, very different, even within the same municipality, because it is strictly linked to the culture,

1 knowledge, traditions and habits of each community in its small space. For this
2 first technical result relating to the tools in favor of local development
3 planning, we present below an example of maps to say actors and
4 corresponding GIS maps of the **Hondobomo** village of the municipality of
5 Alafia (Fig. 5) and (Fig.6).

6   In these localities, the participants had to produce themselves the spatial
7 representations of their territory as well as the various sacred or not secret
8 objects (sacred woods, lakes, mosques, ancestral cemeteries, etc.) that populate
9 their environment. Like many African societies, the actors prefer a topocentric
10 representation of space rather than a Western geometric representation (Le
11 Roy, 1991). In other words, all objects like (town hall, mosque, cemetery,
12 pasture ...) are represented as dots. This form of representation is much more
13 compatible with their natural vision of objects on earth.
14
15 **Figure 5**. *Maps to say actors of Hondobomo (source: Yanogo, AG Dalla,*
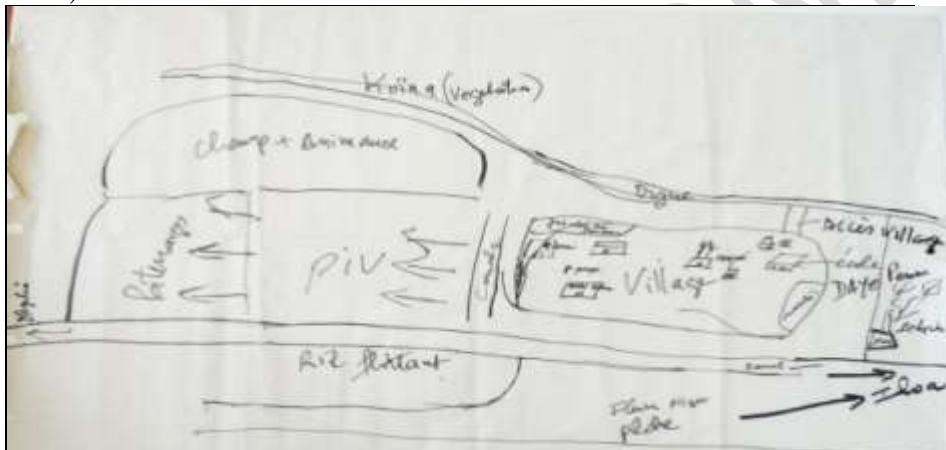16 *2013)*

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18
19 **Figure 6.** *Corresponding GIS maps of the Hondobomo (source:Yanogo, AG*
20 *Dalla, 2013)*

21
22   With regard to the result related to participation, our experience helped to
23 increase the firm will to rely on their own capacities and knowledge for the

1 local development of their land among local populations. Indeed, following the
2 open and free debates, during our multiple meetings, a   permanent framework
3 of dialogue was born, which generated a feeling of assertion, self-confidence
4 and strengthening of the citizenship of these local populations.

5   Some development partners, with whom we have worked during these
6 years, involve local communities more and more in development projects, at
7 least in their diagnostic phase. They are no longer limited to involving them
8 only in collecting data, but also in analyzing it. Among these partners, we can
9 cite GIZ (German Cooperation), the NGO Action Against Hunger (ACF), SNV
10 (Dutch Cooperation) and several local NGOs such as the Malian Association
11 for Survival in the Sahel (AMSS) or the Association for the Development of
12 Northern Mali (ADENORD) based in Timbuktu. Some partners, such as
13 Rhône-Alpes Cooperation, France, located in the Timbuktu region, go so far as
14 to encourage municipal decision-makers to move towards institutionalizing
15 participatory approaches in all development processes.

16
17 *Discussion*
18

19   The participatory mapping workshops quickly turned into real negotiation
20 frameworks between the different actors. Also, even if the process did not
21 always lead to a consensus, in several cases, the "common" spatial
22 representation of the village territory and its surroundings as well as the
23 reflection carried out around its planning made it possible to smoothen, flatten
24 or even settle conflicts between lineages and between different actors
25 exploiting the same resources in the same village or between neighboring
26 villages.

27   However, despite these satisfactory results, our method may be improved,
28 particularly in terms of the conduct of participatory processes and the impact of
29 the tools produced. Indeed, in the implementation of the participatory
30 workshops, some major difficulties remain, including the influence of opinion
31 leaders on the decision making. This situation, where decision making escapes
32 local populations, poses questions and problems as to the success of the
33 objectives targeted in the participatory-approach workshops. The objective of
34 political leaders of all stripes remains their manifest desire to influence the
35 management of participatory workshops and their results.

36   This vital knowledge to define the most relevant elements to follow in
37 information systems designs, their interpretations and decision making is far
38 from easy and is almost never acquired in our area of study. In most cases, the
39 choice of the quality of participants in the processes is far from innocent. We
40 have the real impression that in some cases their role is limited to participating
41 in collective meetings to answer questionnaires according to the wishes of the
42 socio-political leaders. This threat of poor representation can in some cases
43 become the cause of several conflicts over land or the management of natural
44 resources (Gueye, 1999).

45   In our experimental commune, despite our belonging to the community
46 and our knowledge of the majority of actors and their leaders as well as the

1   various issues, some elected officials or community leaders have repeatedly
2   wanted to influence our workshops in order to address a desired subject in a
3   preferred place by inviting designated actors and often with barely veiled
4   pressures. In a context of local poverty, the technician finds himself forced to
5   not use his scientific approach, but rather those dictated by the financial
6   partner(s).
7   The risk of being wrong is omnipresent and very high. Participatory
8   processes can, under certain conditions, have the opposite effects to those
9   expected. Indeed, mastering the tools for collecting, analyzing and managing
10 information and even having the right resources is not enough. It is also
11 necessary (Totté, 2003). to have a sufficient knowledge of the dialectical
12 relationships that exist between man, his family, his clan, his village, his land,
13 his techniques and his institutions (modern or traditional).
14   It is also necessary (Gueye, 1999) to avoid the flaw of wanting to
15 standardize the participatory processes by ignoring the specific nature of the
16 issues, objectives and contexts of each case. Participatory approaches remain
17 the challenges posed by recognizing the diversity of interests of the different
18 actors. Undeniably, the participatory approach requires that the researcher or
19 the facilitator takes into account the diversity of social dynamics and logics of
20 interest of various orders (material, political, social ...). Stakeholders,
21 especially outsiders, should also be wary of the apparent homogeneity of the
22 community. There is also the problem of the personality of the technician in the
23 organization of these workshops. In addition, as (Chambers, 2006) pointed out,
24 some technicians, in their role as facilitators, significantly influence the
25 participants, the nature of the results and relationships with power.
26   On the technical level, although the actors' cards produced by the local
27 populations have proven to be good tools for dialogue between the partners,
28 their importance should be put into perspective. Actually, beyond the aspects
29 of fidelity to the knowledge and respect for the beliefs of the natives, that we
30 are trying to idealize, we have no illusions about the neutrality of the cards
31 obtained as pointed out during an experiment on the neutrality of participatory
32 cartographic tools for Senegal (Boutinot and al, 2009).
33   Also, because it serves as a vector of exchange between the different
34 actors, the actors' cards are also indicative of social and political issues. This
35 brings us to prioritize in our mind the process (dialogue) over products
36 (management plan, map, etc.), which must in any case be regularly improved
37 and updated. On the other hand, our methodology is still in an experimental
38 state, the objects represented on the actor map are those that the target
39 population wants to represent and the arrangements based on this map will also
40 depend on what the populations want to see fit out. There is truly a feeling of
41 something incomplete, because you can never be sure that the whole
42 geographical entity nor all the problems are taken into account. For this reason,
43 the quality and reliability of these actor cards may be below the qualities
44 required to carry out an adequate territorial diagnosis.
45   Finally, our methodology is based on small spatial entities. The
46 implementation of participatory mapping at the scale of the entire municipality

1 or even the entire department would be interesting but very difficult to achieve.
2 In fact, due to the diversity of actors and the contours of entities that are
3 necessarily ill-defined on the margins of the disputed territories, making these
4 maps end-to-end coherently on a higher scale will be socially and politically
5 complex.
6
7
8 **Conclusion**
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10 Our approach to building tools and methods based on participatory
11 mapping aims to lift the lock on the ability of grassroots' communities to
12 participate in territorial decision making. But the challenge is enormous
13 because the constraints range from the lack of resources of local respondents to
14 perpetuate efforts and achievements to resistance to change on the part of local
15 authorities and also of certain external partners. The experience also made it
16 possible to better understand the local management methods of the territory
17 and facilitate the bringing together of the different communities in negotiation
18 dynamics. The co-developed tools have shown their full potential to achieve
19 the objective despite their simplicity.
20 The study has also shown that the success of such experiences depends on
21 their institutionalization and all the more so because we are in an environment
22 of great poverty where modern technologies are almost non-existent. Also, the
23 generalization of the implementation of participatory approaches as well as the
24 use of related tools for the benefit of local development, such as participatory
25 maps, still remains a major challenge. This difficulty remains extremely acute
26 in a continental Sahelian country like Mali where the sustainability of such
27 activities, although promising for economic and social development, is
28 practically impossible with equity.
29 Our workshops at the level of each village/fraction in the commune can
30 serve as embryos for this organization once peace and living together
31 conditions in the communities have been found. This requires from the
32 authorities a real decentralization of decision-making powers, which would not
33 be limited to a simple ad hoc consultation of the communities but rather
34 facilitate the exercise of the right of scrutiny and control by local communities
35 over the way development programs are planned and piloted.
36 Finally, our results open up research perspectives, with a view to
37 deepening the close relationship between local spatial knowledge, participatory
38 approaches and the implementation of socio-political projects. These research
39 perspectives are to be extended to the diversity of lifestyles of Sahelian
40 populations in the economic turmoil faced with the predominance of cultures
41 and identities. Our experience of mapping according to actors and the
42 establishment of a Participatory Information System for development in
43 northern Mali opens, despite its limits and the difficulties encountered, avenues
44 which seem useful to us for more fair and harmonious development. However,
45 given the scarcity of human and financial resources in the Sahel as well as the
46 changes underway and the hypothetical impact of international aid, it is

necessary to boost collaboration and sub-regional and international partnerships to achieve synergy of actions.

Within the framework of this international to Sahelian countries, the international community need to take into account the views and opinions of the basic populations in their development strategy at the risk of making the region a hotbed for corruption and an area of permanent insecurity.

References

Aberly, D., Sieber, R. (2002). *Principes de SIG de participation publique*. Première conférence internationale PPGIS détenu par URISA à l'Université Rutgers, New Brunswick, New Jersey, p. 20-22.

Arnstein, SR. (1969). *Une échelle de la participation citoyenne*. Journal de l'American Institute of Planners, 35, p. 216-224.

Guèye Bara, *Où va la participation, Expérience l'Afrique de l'Ouest Francophone*, 1999.

Batton-Hubert, M., Joliveau, T. et Lardon, S. (2009). *Modélisation spatiale et décision territoriale participative. Conception et mise en oeuvre dans des ateliers chercheurs acteurs*. Revue internationale de géomatique 18/2008 (Représentations spatiales dans les démarches participatives), p. 549-569.

Boutinot, L. Viau, A.A., Leclerc, G. (2008). *Questions sur la neutralité des outils de type jeux de rôles et cartographie participative dans une expérience de gouvernance foncière au Sénégal*. Norois, n°209,2008/4, p.73-89.

Brunet, R. (2004). *Compte rendu du livre Aspects organisationnels des SIG intitulé SIG et citoyenneté* pour la revue Mappemonde, n° 76 (4-2004), (2004).

Burini, F. *La cartographie participative dans la recherche de terrain en Afrique: le cas des villages riverains au Parc Régional*. 2005, Policy Matters. Édition spéciale, UICN: s.p. (page consultée le 26 juin 2013). www.iapad.org/publications/ppgis/Burini_CIRAD.pdf

Casti, E., Yonkeu, S. (2008). *Le Parc national d'Arly et la falaise du Gobnangou*, Paris, L'Harmattan, 269 p.

Caron, P., Lardon, S., Maurel, P. et Piveteau, V. (2001). *Zonages à dires d'acteurs: des représentations spatiales pour comprendre, formaliser et décider. Le cas de Juazeiro, au Brésil*. Représentations spatiales et développement territorial. Paris, Hermes: p. 343-357.

Caron, P. et Cheylan, J-P. (2005). *Donner sens à l'information géographique pour accompagner les projets de territoire: cartes et représentations spatiales comme supports d'itinéraires croisés*. *Géocarrefour*, vol. 80/2 | 2005, p. 111-122.

Chambers R. (2006), "Participatory mapping and geographic information systems: Whose map? Who is empowered and who disempowered? Who gains and who looses?", *Electronic Journal of Information Systems in Developing Countries*, vol. 25, n° 2, pp. 1-11. DOI :10.1002/j.1681- 4835.2006.tb00163.x

Chrisman, N.R. (2005). *Full Circle: Plus que des implications sociales du SIG*. Harvey, F. (éditeur de numéro spécial), Cartographica.

CILSS), Comité Inter – Etats de Lutte contre la Sècheresse dans le Sahel (1992). *Les stratégies sahéliennes de lutte contre la sècheresse et de développement*. Comité Inter-Etats de Lutte contre la Sècheresse dans le Sahel. CILSS. Ouagadougou, 110 p.

Craig, W. J., Harris, T. M. & Weiner, D. (2002). *Community Participation and Geographic Information Systems.* Taylor & Francis, 383 p. (ISBN: 0415-23752-1).

D'Aquino, P., Seck, S.M. et Camara, S. (2002). *Un SIG conçu par les acteurs: l'opération pilote POAS au Sénégal*. L'espace géographique, n° 2002-1, p. 23-37.

D'Aquino, P., Le Page, C., Bousquet, F. et Bah, A. (2002). *Du jeu de rôle à la simulation: pour des systèmes d'information à référence spatiale conçus directement parles acteurs. Résultats d'une expérience menée au Sénégal.* L'information géographique n°4, p. 310-323.

Gata, T., Thierry, G., Handja, Long, C. et Lutonde, E. *La cartographie participative et la planification de l'utilisation des terres*, 2008, expériences en République Démocratique du Congo, mis en ligne en 2008 (page consultée le 12 mai 2012) www.iapad.org/publications/ppgis/cartopart.pdf.

Ghose, R. (2004). *SIG et participation citoyenne: Des projets de revitalisation urbaine aux États-Unis.* in Aspects organisationnels des SIG. Paris, S. Roche et C. Caron, Hermès Lavoisier, p. 255-266.

Hirt, I. *Mapping Dreams/Dreaming Maps: Bridging Indigenous and Western Geographical Knowledge. 2012. Cartogr. Int. J. Geogr. Inf. Geovisualization, 1 janvier 2012, vol. 47, n°2, p. 105-120. (page consultée le 20 juin 2012).* http://www.dx.doi.org/10.3138/carto.47.2.105

Hirt, I. (2009). *Cartographies autochtones : Eléments pour une analyse critique (Indigenous mapping: elements for a critical analysis)*. L'Espace géographique, 2009, vol. 2, p. 171-186.

Jankowski, P. et Nyerges, T.L. (2001). *Geographic information systems for group decision making: towards a participatory, geographic information science*. London, New York, Taylor & Francis. 273 p.

Joliveau, T., Molines N., et Caquard, S. (2000). Méthodes et outils de gestion de l'information pour les démarches territoriales participatives. Un regard France-Québec Rapport réalisé dans le cadre du 15ème appel d'offre Jacques Cartier-Novembre 2000.

Joliveau, T. (2004). Les ateliers participatifs de diagnostic territorial. Méthodologie pour un diagnostic de territoire. Rapport du projet de recherche pour la Datar, ENGREF équipe POP'TER, Clermont-Ferrand, p. 85-114.

Marty, A. (1985). *Crise rurale en milieu nord-Sahélien et recherche coopérative. L'expérience des régions de Gao et Tombouctou, Mali, 1975*. Thèse de doctorat d'État, Université François Rabelais, Tours, 926 p.

Mericskay B. et Roche S. (2011) *Cartographie 2.0 : le grand public, producteur de contenus et de savoirs géographiques avec le web 2.0*, 2011, Cybergeo: European Journal of Geography, document 552, (page consultée le 24 octobre 2013). cybergeo.revues.org/24710

Pickles J. (1999), "Social and Cultural Cartographies and the Spatial Turn in Social theory", Journal of Historical Geography, vol. 25, n° 1, pp. 93–98.

Rambaldi, G., Callosa-Tarr, J. (2000). Manuel sur participative 3-D de modélisation pour la gestion des ressources naturelles. Essentials de gestion des aires protégées dans les Philippine. vol 7, NIPAP, PAWB-DENR, Philippines.

Sall, A. (1993). *Le pari de la décentralisation au Mali: Tome 2: Textes fondamentaux* (1955-1993), édition SODIFI, août 1993, 332 p. *développement et démocratie.* Karthala, Paris, 491 p. Actes du colloque sur «Les sociétés pastorales en Afrique sahélienne», Niamey, Niger, novembre 1997.

1   Sieber R., (2006), "Public Participation Geographic Information Systems: A Literature
2   Review and Framework", Annals of the Association of American Geographers,
3   vol. 96, n° 3, pp. 491–507. DOI : 10.1111/j.1467-8306.2006.00702.x
4   (Totté M., T.Dahou, R. Billaz, 2003). « La décentralisation en Afrique de l'Ouest -
5   Entre politique et développement ». Edition Karthala, décembre 2003, 402 pages.
6   Yamba B. et Bouzou, I. 2008 *Savoirs locaux et gestion des écosystèmes sahéliens*. Les
7   Cahiers d'Outre-Mer, (page consultée le 12 octobre 2012). http://com.revues.org/
8   3762
9