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A REFLEXIVE CARTOGRAPHY TO TACKLE POVERTY: A MODEL OF PARTICIPATORY ZONING

1. INTRODUCTION

The present study advocates a strategy aimed at implementing the principles of sustainable development through operational tools to be used in programs for environmental conservation. To be more precise, I lay out a proposal of participatory zoning that is innovative in two main respects: i) it is based on an assessment of the territorial setup and the social values of the peoples who inhabit the peripheries of parks; ii) it is represented through customized GIS cartography.

As a matter of fact, cartography and field research have been seen as two complementary phases which provide both theoretical reflection and practical application when ordinary criteria in the zoning of park peripheries are challenged. The new zoning criteria rely on the recovery of the territorial perception of local communities whose consensus on plans for environmental conservation is thus ensured. In sum, we advocate a zoning model that may prevent conflict between local communities and international agents while also promoting development of the former [1].

This zoning model is the result of new theoretical approaches that show how a given territory may be used together with its local systems of representation in order to examine and understand the functioning of a social group [2]. Yet this model is not merely theoretical, for its pragmatic value has been demonstrated within the ECOPAS program in a specific territorial context - the peripheries of the trasboundary W Park (Benin, Niger, Burkina Faso)—where it has proven effective.

2. CARTOGRAPHY: A MILESTONE IN COOPERATION

Our zoning model sees territory as the result of a dynamic interaction between the natural environment and the peoples who inhabit it [3]. One cannot fail to consider this if one admits that the notion of territory does not merely convey the material conditions of the humans who settle there but also embodies symbolic, cultural and communal values on which the functioning of a given society depends [4]. This is all the more relevant in specific contexts, such as the African one, where black settlements along the peripheries of parks, removed as they are from urban areas, are still largely based on a traditional system of cosmogonic rules bearing primarily upon territory and the rights to own land, to hunt, or to farm. Hence the need to carry out field research in ways that may effectively account for such complex variables rather than focus exclusively on the set of material data which cartographic reconstruction ordinarily employs.

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For the present purposes, cartographical theory must be approached with an eye on cartographical semiosis, a theory whereby the drawing of a map must not be severed from an analysis of territory, for maps act as mediatory agents between a given society and its territory. Emphasis is thus shifted from the role of maps as descriptive items to the role of maps as prescriptive operators whose self-referential sets of information effectively impinge upon territorial intervention. In this view, maps address the complexity of geographical space by arranging it within a controlled cartographical space on the basis of which action is determined [5].

To be sure, cartographical semiosis differs from cartographical studies still rooted in scientific positivism where analysis was centered upon the technical, structural aspects of maps and on what maps purported to represent. Those studies only served to sanction the presumed or claimed objectivity of cartographical maps. Since the idea of maps as objective mirrors of reality was abandoned, maps have been taken as evidence intellectual appropriation on the part of humans who aimed at establishing their rule over parts of the world. And a cartographical map can now be seen both as a social product which shows how a given society builds its own system of territorial knowledge, and as a means of communication whereby this knowledge is circulated, a sort of operator which influences those who interpret it and affects decisions [6]. This perspective reclaims both the constructive and the communicative aspect of maps, and *emphasis is shifted from what maps represent to what they convey about the deep meaning of territory.*

In light of this current interpretative approach, maps nowadays figure as highly performative tools in data processing, both at the regional and at the local level; tools that can yield new territorial perspectives. It should be noted that we do not primarily aim to provide specific referential information of the kind found in topographic maps: we set out to recover social data that may bring to the fore the complexity of territory. In fact, studies carried out within specific cartographic fields - such as GIS cartography or graph-based planning - demonstrate that new communicative options open up once strict encoding rules are left behind [7]. And cartography is thus allowed to address a variety of different needs ranging from visualization, readability and communication to time projections and concertation. Far from being only a useful representational tool, cartography sets up the context in which the viewpoints of institutional agents - who are appointed to plan environmental or territorial conservation - are brought into question and set side by side to those of local operators - who employ specific territorial knowledge to promote or hinder conservation.

What was left to consider was how all this could translate into a cartographical model capable of outperforming topographic representation by accounting for the social value of territory in territorial planning. For the relevance of theory also depends on whether it lets us act proficiently upon forthcoming documentation and whether it lets us deliberately qualify the information maps convey. Distortions that may result from producing or using maps unwittingly - together with the misleading or blatantly deceptive readings of territory that ensue - may thus be avoided [8]. Hence the political relevance of the *plan map*, from which local communities and appointed agents draw their institutional legitimacy [9].

3. FIELD RESEARCH AND CARTOGRAPHICAL METHODS

Our research experience at the peripheries of W Park was developed on the basis of the new approach to cartography outlined above. We first tried to recover the identity and the communal values of African peoples through a socio-territorial analysis aimed at laying out a cartography of peripheries within an extensive conservation area - the trasboundary W Park that crosses the borders of Benin, Niger, and Burkina Faso [10]. In the course of our research we found that in

order to produce a reflexive cartography with regard to the social value of territory we needed to invest heavily in each of the research phases. Namely:

- it was crucial that information on the social meaning of territory should appear on the map;
- such information had to be symbolically encoded in ways that reclaimed the social values of the people who inhabited that territory;
- the map must convey the socio-territorial setup by featuring its social practices;
- in order to achieve cumulative data integration, it was necessary to work at both scales (regional and local);
- the adoption of the map in planning must account for the results of cartographic communication as highlighted through semiotic studies (self-reference and iconization).

The field research was conducted over a total period of 12 months and for three drought seasons by a mixed team of researchers from Northern and Southern institutions (University of Bergamo, Italy; University of Cotonou, Benin; University of Niamey, Niger; University of Ouagadougou, Burkina Faso) who had previously been trained in the methods and theory to be used in research. Since the pieces of information to be collected must reflect social practices, they were necessarily recovered by direct observation of the territory and later collated within a thorough socio-territorial inquiry. Top priority was thus given to the recovery of basic issues and to an understanding of the symbolic values which underlie traditional communities. Taken together, these two phases make up the framework of cartographical information.

Collected data processed via GIS software and yielded a cartographic representation in terms of ***knowledge-based zoning*** [11] on two different scales: regional and local. At the regional scale, specific knowledge coming from inhabitants and general knowledge of socio-territorial systems at the regional level were put together. Also, Western-based criteria (number of villages, population density, ongoing dynamics, ..) were matched with African categories, which ultimately allowed for a translation and a revaluation of the basic values underlying territory. Regional maps served primarily to encode quantitative and qualitative data which gave us a measure of the dynamics at work in the areas analyzed and of the social phenomena that bring about change or ensure stability [12]. Information thereby produced yielded a representation of the socio-territorial layout at the peripheries of the Park, and served, above all, to highlight change factors and to suggest plans and modes of intervention (FIG. 1-2).

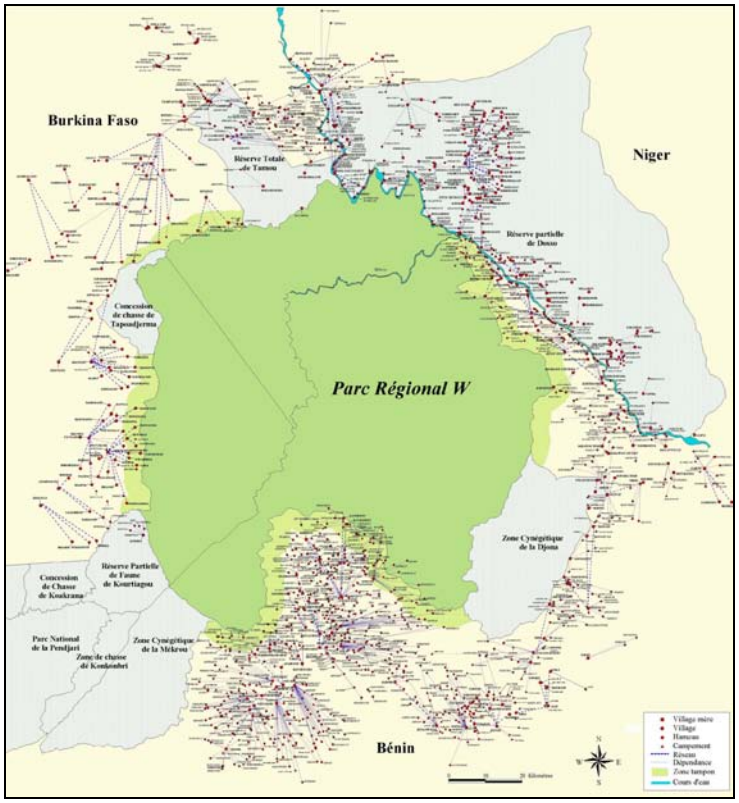

Figure 1: Example of regional cartography that recovers the traditional setup of the villages

If we now turn to the other side of cartographic research, the participatory one, carried out in the same context on a local scale, we must keep in mind that it involved local people, actively called upon in the researching of communal practices: this has established a common ground for a discussion of the measures for environmental conservation between the involved parties [13]. What we did in this case was to approach the participatory map in ways that could bring out new, relevant pieces of information [14]. For participatory maps are not invariably and purposefully used in planning and in cooperation: their communicative clues are often neglected in practice, instead of being used to voice the issues of populations who inhabit the Southern hemisphere. As a matter of fact, the mere adoption of a participatory map as a data-gathering tool does not ensure a true reassessment of the social values rooted in territory [15]. Conversely, an analysis of the semiotic potential of participatory maps shows how they can be used effectively to make sense of the knowledge shared by local communities [16]. Participatory maps have proven particularly effective in the research field of environmental conservation, where they provide key information on the relationship between local settlements and their environment by shedding light on conventional practices of conservation and resource exploitation as conveyed in the symbolic values local inhabitants employ. What we kept in mind in our experience was essentially the evidence provided by cartographical semiosis, i.e. the fact that the esthetic layout of a map may equally well turn out to be an aid or a hindrance, all

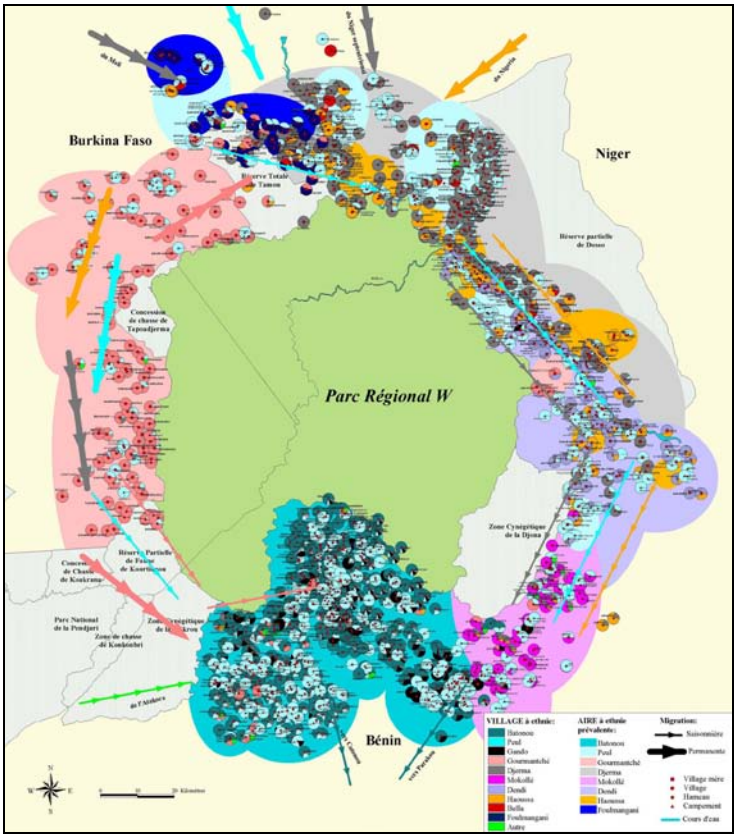

Figure 2: Example of regional cartography that shows the migration flows

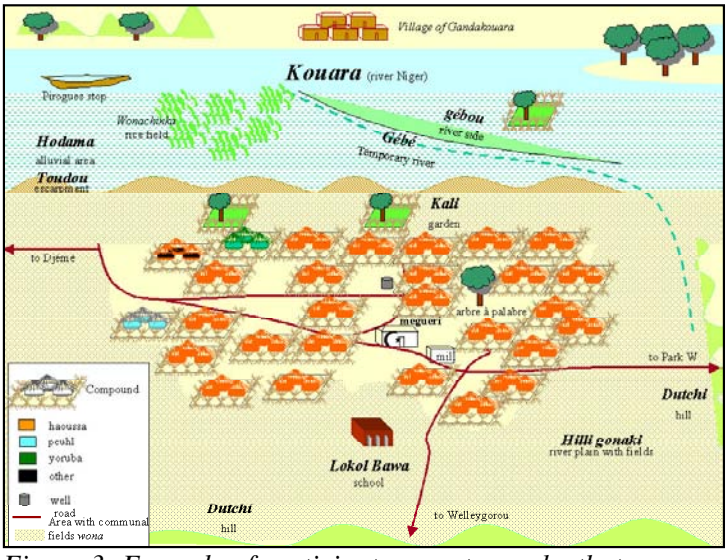

Figure 3: Example of participatory cartography that recovers the territorial organisation of local population

the more so when we are dealing concurrently with different cultural contexts. Our participatory maps were processed by using the language of analogy which - by virtue of its reliance on perceptual experience - has proven easier to understand [17] (FIG. 3). To be sure, the readability of a map does not depend exclusively on its allowance for perceptual experience, but also on the proficiency local agents are granted in gathering socio-territorial information and in interpreting it on the connotative, social level. Once again cartographical semiosis comes to the rescue in extracting and expressing features of maps that would otherwise have lain hidden; features which later helped to substantiate claims and corroborate knowledge as conservation was planned. In communicative terms, the tool of cartographical representation proved surprisingly effective at the very outset of research, as it helped researchers to give shape and sense to a plethora of collected data. Documentation thus produced was later used to come up with plan cartography which proved unpredictably useful in participatory development programs [18]. Our first attempt in this phase was to use cartography as an information-generating tool to supplement field-research data [19]. On a regional scale, the map allows for comparative analysis of the kind that would have been virtually impossible by relying only on endless lists of itemized data. On a local scale, the map highlights community values and knowledge items which conventional methods of inquiry would have neglected. At the planning stage, interpretation of the new data collected by this cartography made it possible to formulate predictive assumptions as to the effectiveness of our research model and its conservation project.

At a later stage, which could be defined as ***intervention zoning***, we used previous results to conceive and set up a model of participatory zoning for the peripheries of W Park. This model is based on three main criteria: *cohesion*, which examines the extent to which territory is homogeneous to make sure that the conservation project matches local issues; *pressure,* which takes into account the extent of human intervention on the natural resources to be preserved and gives us a measure of the urgency and priority of conservation planning; and lastly *localization*, which looks at how close or how distant human settlements are with respect to the Park limits in order to come up with an index of anthropic persistence within the research area. These criteria were used to lay out three different zones: *first-level*

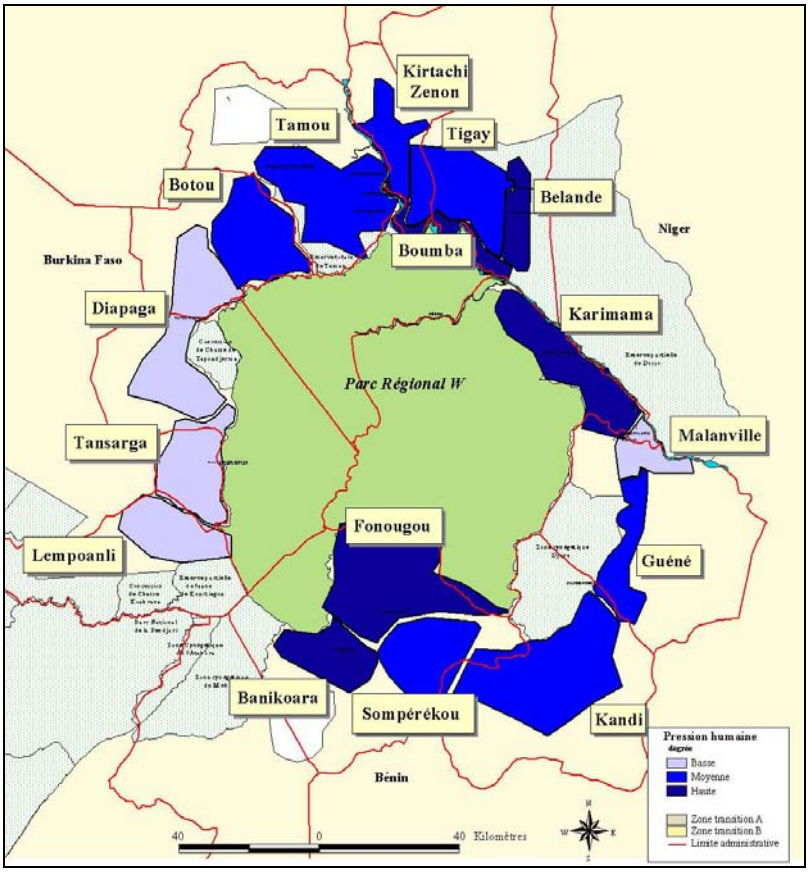

Figure 4: Cohesion and pressure of zoning sectors in the periphery of the W Regional Park

units, established on the basis of socio-territorial cohesion; second-level units, or *sectors*, defined on account of the cohesion or pressure exerted on natural resources; and a *localizing frame,* which depends on the distance of settlements from the park and the protected areas. The final zoning map was obtained by integrating these three zones types (FIG 4).

The fourth research phase could be named ***contractual zoning***. It is the pragmatic phase of co- management, where a zoning map - aimed at providing a practical management tool - is produced [20]. We proposed an innovative type of management based on the joined results of cartography and field research; a management which effectively boosted negotiation between the parties involved by making them aware of cartographical dynamics. Identity values, on the basis of which local communities establish their territorial setup, are thus used to devise a new model of participatory zoning on the peripheries of the protected area. Far from being merely a theoretical instrument, this model provides a valuable operational tool for participatory management and conflict prevention on park peripheries.

4. CONCLUSIONS

The model we put forward here is intended to meet the difficult task of finding methods and tools to be used immediately in practice, so that planning may yield concrete results based on thoughtful consideration of traditional socio-territorial systems, in compliance with the theoretical goals set up in policies of sustainable development. More exactly, on the basis of recent acquisitions in the fields of complex representation systems and of new theoretical approaches on the communication concerning the deep meaning of territory, we set out to develop a new conceptual model of reflexive cartography that can sensibly contribute to the defining a participatory approach. This is achieved by marking territorial zones of intervention and by careful plans aimed at a sustainable exploitation of resources and at long-term participatory management of park peripheries. Zoning - already taken up as part of the ECOPAS program - shows the potential of cartography as a hypertext whereby poverty data are found, collected, and catalogued both by members of the scientific community and by agents involved in conservation. We submit the present research as evidence of the methodological value and its applicability to many other possible contexts.

NOTES

1. In fact, the method I call for relies on an important series of methodological suggestions made with the intent of promoting cooperation with peoples from the Southern hemisphere and thus ensure their involvement. I am thinking in particular of suggestions made as part of IIED projects (International Institute for Environment and Development) and of RRA (Rapid Rural Appraisal, see: R. Chambers, *Rural Development: putting the last first*, Longman, London, 1983), which during the 80s evolved into what is now the PRA (Participatory Rural Appraisal). Recently, the same research group introduced a further development to this model, called PAPPA (Policy Analysis for Participatory Poverty Alleviation, see: Clark University, Egerton University, Ghana Organisation of Volunteer Assistance, *Listening to the people: linking national policy and local action. The PAPPA field guide to poverty alleviation in Ghana*, Worcester, 2001). In the second half of the 1990s the PRA approach was renamed (Participatory Learning and Action), to underline the changes this participatory method had undergone in time (J. Pretty, I. Guijt, I. Scoones, J. Thompson, *A Trainer's Guide for Participatory Learning and Action*, International Institute for Environment and Development, Sustainable Agriculture Programme, London, 1995). It should be noted that, while we acknowledge the merit of these methods, we feel that our proposal differs insomuch as it does not aim at collecting a plethora of data, but in interpreting them in light of our understanding of the

symbolical value of territorial practices in basic societies. See for instance: E. Casti, P. Marino, "Protezione ambientale e sviluppo rurale nella politica della C. E.: il Programma Bassins Versants in Guinea", in *Terra d'Africa 1997*, Milano, Unicopli, p. 41-84.

2. To be more precise, I am referring here to the two theories which were developed in the context of geographical sciences in Italy and were later widely circulated. The notion of territory relies on the Geographical Theory of Complexity developed by A. Turco (see: A.Turco, *Verso una teoria geografica della complessità*, Unicopli, Milano, 1988 and, as far as Africa is concerned: Id., *Geografie della complessità in Africa*, Unicopli, Milano, 1986). The theory of territory representation is based, instead, on the *Theory of Cartographical Semiosis* developed by E. Casti (see: E. Casti, *Reality as representation. The semiotics of cartography and the generation of meaning*, Bergamo University Press, Bergamo, 2000).
3. See: A.Turco, *Verso una teoria…*, op. cit.
4. As to identity construction in territorial dynamics, A. Turco introduced the concept of *identity discourse*, to underline how the features of social identity, being based on the evolutionary mechanisms which connote territory, cannot be established statically in time but must be understood as processes which embody change. (A.Turco, "Sociotopies: institutions géographiques de la subjectivité", in: *Cahiers de Géographie du Québec*, vol. 45, n. 125, 2001). On the issure of identity and territory see also the international contributions of: J. Bonnemaison, L. Cambrezy, L. Quinty-Bourgeois (ed), *Les territoires de l'identité. Le territoire, lien ou frontière?*, L'Harmattan, Paris, 1999; F. Thual, *Le désir de territoire: morphogenèses territoriales et identités*, Ellipses, Paris, 1999; C. Brace, *Landscape, place and identity*, SAGE, London, 2002.
5. This approach is part of the theoretical attempt to bracket cartographical interpretation with the results of semiotics. See for instance: D. Wood, *The Power of Maps,* New York, Guilford Press, 1992, chap. 5; A. Mac Eachren, *How Maps work, representation, visualisation and design,* New York, Guilford Press, 1995. The position this approach now holds in cartographical studies is of consequence, although only a few researchers, mainly associated with the *Commission on Theoretical Cartography*, a work team of the *International Cartography Association* (ICA) have adopted it. Incidentally, researchers from this Commission also founded a journal entitled *Diskussionsbeiträge zur kartosemiotik und zur teorie der kartographie*, edited in Dresda by A. Wolodtschenko and H. Schlichtmann (respectively President and Vice President of the Commission). You may consult their website at: http://rcswww.urz.tu-dresden.de/%7ewolodt/tc-com/.
6. With reference to these two aspects of cartography and to the notion of map as a social product see J. B. Harley, *Deconstructing the map*, in: T. Barnes, J. Duncan (eds), *Writing Worlds: Discourse, Text and Metaphor in the Representation of Landscape, Routledge,* London and New York, 1992; C. Jacob, *L'empire des cartes. Approche théorique de la cartographie à travers l'histoire*, Albin Michel, Paris, 1992; F. Farinelli, *I segni del mondo. Immagine cartografica e discorso geografico in età moderna*, La Nuova Italia, Firenze, 1992. For a discussion of maps as means of communication see E. Casti, *Reality as representation…*, op. cit.; Id., "Towards A Theory Of Interpretation: Cartographical Semiosis", in: *Cartographica*, 2004, forthcoming.
7. Among the many contributions on the subject, and especially on how maps work as primary documents to be consulted in territorial intervention projects see: O. Söderstrom, *Des images pour agir, le visuel en urbanisme*, Payot, Lausanne, 2000; B. Debarbieux, S. Lardon, (ed), *Les figures du projet territorial*, Ed. de l'aube/datar, Paris, 2003.
8. For an analysis of the role maps played during the colonial era, see my recent contributions: E. Casti, "Mythologies africaines dans la cartographie française au tournant du XIXème siècle" in C*ahiers de Géographie du Québec*, vol. 46, 2001, pp. 429-450; Id., "Les ateliers 'culturels' de l'Ailleurs: la cartographie de l'Afrique coloniale italienne", in M. Colin, E. R. Laforgia (eds) *L'Afrique coloniale et postcoloniale dans la culture, la littérature et la société italiennes*, représentations et témoignages*,* Presses Universitaires de Caen, 2003, pp.15-40 ; E. Casti, "L'iconisation cartographique en Afrique coloniale", in: Jean-Paul Bord, Pierre Robert Baduel (eds), *Le cartes de la connaissance*, Karthala - Urbama, Paris-Tours, 2004, pp. 419-435.
9. For a recent discussion of cartographical issues at stake in contemporary politics see: J. Lévy, P. Poncet, E. Tricoire, "La carte, enjeu contemporaine", Dossier n. 8036, *Documentation photographique*, La documentation Française, Paris, 2004.
10. The W Regional Park covers a vast region - approximately 17.000 km² which actually amount to 25.000 km² if we take the Park and its peripheries – and its relevance for global conservation depends on a number of reasons: it is one of the few extant areas of transition between the vegetation and fauna of the sahelian and of the savannah

lands; it comprises important settlements of Western African communities dating back to more than 200.000 years ago; it holds traces of an uncommonly rich and diverse culture. Ever since 2000, the ECOPAS program initiated a scientific assessment of the state of resources in this environment. Priority was assigned to analyzing territory in a multidisciplinary manner by carrying out research on factors that may be affecting social dynamics at the local level. This was done with an eye on strategies for local development, on settlements found on the peripheries of such ecosystems, via a new cartographical and zoning approach receptive to the complex issues raised by the data we had collected. The park peripheries area comprises 1.700 settlements for a total of about 650.000 inhabitants.

11. On social aspects of GIS, see for instance: H. Campbell, I. Masser, *GIS and Organisations*, Taylor and Francis, London, 1995; M. F. Goodchild, "New Horizons for the Social Sciences: Geographic Information Systems", in: *Canadian Journal of Policy Research*, 1/1, 2000, pp. 158-161; H. J. Miller, "What about People in Geographic Information Science?", in: *Computers, Environment and Urban Systems*, 27, 2003, pp. 447-453; National Center for Geographic Information Analysis (NCGIA), "Gis and Society: the Social Implications of How People, Space, and Environment Are Represented in GIS", in: National Center for Geographic Information Analysis (NCGIA), *Technical Report*, 1996, pp. 96-96; J. Pickles (ed), *Ground Truth, the social implications of geographic information systems*, Guildford Press, New York, 1995. You may also consult *Cartographica*, Volume 39, Spring 2004, an issue entirely devoted to the relation between GIS and the social sciences.
12. We produced 11 regional maps featuring: population (number of inhabitants, ethnic layout); territorial layout and resource utilization (traditional setup, settlement modes and settlement pressures); traditional and modern issues (local trade; symbols related to traditional or modern customs).
13. The well-known guidelines to this approach are listed in various publications edited both by IUCN, and by other institutions that suggest useful working methods and tools for local community meetings. Such methods can usually be employed elsewhere, in different territorial contexts and may apply to different types of planning (IUCN, UNFPA, *Our People, Our Resources*, IUCN publications, Cambridge UK, 1997. See also IIED (International Institute for Environment and Development) and FAO (Food and Agricultures Organization of United Nations) publications.
14. In accordance with PRA, FAO have for the first time adopted the term *participatory map* (FAO, *Tree and Land Tenure, rapid appraisal tools, Community Forest Field Manual*, n. 4, Rome, 1994), and have provided guidelines both for the technical layout of maps and for selecting interlocutors from local communities. All this may in the future converge into advanced computerized cartography. On the implications of this cartographical approach see also E. Casti, "L'Africa? È ancora altrove", *Nigrizia,* aprile, 2003, pp.66-68.
15. Every representation in fact gives voice to a social agent who sets up his/her own worldview in accordance with his/her own culture. Therefore, while we try to recover the place of the other, we actually reconstruct it in a way that violates its self-standing existence. Representations state a social project which actually imposes a new model of identity. For a subtle analysis of how representation affects cartography in its recovery of *the other* see E. Casti, "The Analogical and Digital systems in Euclidean Cartography: the colonisation and iconisation of Africa", *Diskussionsbetraege Zur Kartosemiotik Und Zur Theorie Der Kartographie*, vol. 4, 2001, pp. 15-28.
16. On this subject see: F. Burini, "Le carte partecipative: strumento di recupero dell'identità Africana", in: E. Casti, M. Corona (eds), *Luoghi e Identità*, Bergamo University Press, Bergamo, 2004, pp. 185-214.
17. See: E. Casti, "Il paesaggio come icona cartografica", in *Rivista Geografica Italiana*, n. 108, 2001, pp. 543-582.
18. As to the crucial role played by GIS cartography in participatory and developmental planning see T. Harris, D. Weiner, "Empowerment, Marginalization, and Community-Integrated GIS", in: *Cartography and Geographic Information Systems*, 25, 1998, pp. 67-76; R. A. Rundstrom, "GIS, Indigenous Peoples, and Epistemological Diversity", in: *Cartography and Geographic Information Systems*, 22/1, 1995, pp. 45-57; E. Talen, "Bottom-Up GIS: A New Tool for Individual and Group Expression in Participatory Planning", in*: Journal of the American Planning Association*, 66, 2000, pp. 279-294.
19. Because of editorial constraints, we cannot here elaborate upon these results. Technical documentation on this experience, to be published soon, is currently only available in French. See E. Casti, *Recherche sur les aspects socio-territoriaux dans les Zones Périphériques du Parc du W–Proposition de ZONAGE, III° rapport*, ECOPAS/CIRAD, 2004; C. Brambilla, F. Burini, A. Ghisalberti, *Troisième rapport sur la recherche de terrain et sur la récolte de données concernant les aspects socio-territoriaux dans les Zones Périphériques du Parc W finalisé au repérage des critères pour le zonage*, ECOPAS/CIRAD, Ouagadougou, 2004.

20. Among the numerous contributions on participatory management see: G. Borrini-Feyerabend, *Community Conserved areas (CCAs) and Co-Managed Protected areas (CMPAs) – towards Equitable and Effective Conservation in the Context of global Change*, TILCEPA for EPP project, 2003; P. Abrams, G. Borrini-Feyerabend, J. Gardner, P. Heylings, *Evaluating Governance – a Handbook to accompany a Participatory Process for a Protected Area*, Parks Canada and TILCEPA, draft, 2003; G. Borrini-Feyerabend, "Governance of protected areas: innovations in the air…", in: *Policy Matters. Community empowerment for conservation*, IUCN, issue 12, September 2003, pp. 92-101. M. P. Pimbert, T. Wakeford, *Deliberative democracy and citizen empowerment*, PLA Notes 40.IIED, London; M. Pimbert, "Reclaiming diversity and sustainability in community-based conservation", in: *Policy Matters. Community empowerment for conservation*, IUCN, issue 12, September 2003, pp. 76-86.