

Human Space and Disadvantage in Settlement Distribution A GIS Analysis on the Case of “ronchi” and Some New Considerations about the Approach

Alberto Monti

Università di Bologna
albertom@iol.it

Abstract. As it is known, geographical information systems make various functions available: they can be used to analyze and understand a territory and the spatial phenomena occurring within it. But spatial phenomena GIS can automatically identify by their so-called “spatial analysis” are not directly usable in order to understand historical phenomena, because they represent only abstract feature elaborations of the space itself. On the contrary, they don’t tell us anything about human perception of these features, that is closely connected with each specific cultural scope. Archaeologist who studies the landscape from a historical-cultural point of view cannot thence be satisfied by using softwares following patterns set up by planners who did not reckon with different data-views and perceptions. He has instead to employ these softwares almost as a “programming language” in order to describe views and perceptions that have the space as their stage, but the culture as their actress.

1. Introduction

“I’m sure that the characteristics of activities, of their work-planning and of the foreseen use of a place relating to the whole subsistence-settlement system are codified in the structural organization of the area. We need to know factors that have influenced the choice of places where people could settle down and work in order to adapt and use them”. According to this assumption made by Lewis Binford (Binford 1990), one of the main persons of “new archaeology”, that was – however one sees it – a fundamental movement of archaeology renewal, a close relationship exists between a place, its characteristics and activities man pursued there. As much it concerns us, we fully agree with this statement and we believe that relationship tying the three overmentioned factors is the capability men have got of valuing, by resting on their knowledge fund, when local conditions can agree with aims they want to reach. In other words, when a man or a group of human beings choose a place to bring about several activities, they do it always intentionally, basing on practical or ideological statements, but hardly ever on random ones. If that is true, then, as Binford says, by studying the relationship between anthropic features and sites or settled areas local environmental situation it is possible to obtain important information about human habits and their cultural substratum.

This is the research aim we are trying to achieve within studying ancient landscapes, and the case we’ll briefly expose for example goes in this same direction.

2. An Environmental Approach to Human Settlement in Archaeology

Underlining the importance of relationships tying human behaviours to the characteristics of environment where these same behaviours come true isn’t certainly a new act. It rather

forms the base of one of the principal – if not even the main – modern geography research lines. Starting from French “regional school” developing during the 19th century¹, up to the most recent Tim Ingold’s² studies on correlations between ecology and culture, this theme remains a central one. Anyway, in our opinion, this principle is not enough analytically applied in each feature interpretation of a single archaeological site, even if it is largely accepted in archaeology too, especially as a landscape archaeology³ founding one. What we want to say is that, beyond the mere acceptance of these criteria and their application in a broadly intended interpretative phase, rarely someone tried to qualify and quantify in quite exact terms positivity or negativity each environmental characteristic has in the valuing and choosing process relating to the functions/activities developed in a site. This is on the contrary the procedure we are experimenting and attempting to formalize.

A pretence of numeric quantification can appear as deterministic and mechanical, but it truly adheres to the “quantitative” approach largely applied to social sciences and archaeology itself⁴, in addition to geography. Analytic quantification, as much concerns us, answers the desire of formalizing – in the limit of what is possible and useful for research – a decisional process which, in our opinion, takes place ever and ever, since we think that very few human behaviours are casual, even those ones the same value cannot be consciously accomplished for.

We believe indeed that when a man chooses a place where bring about an activity there is always a moment during which he analyzes the local environmental characteristics in order to value them, although he can later decide whether and how much consider the just identified and quantified advantages and disadvantages.

We cannot forget the disadvantages-advantages practical evaluating process within place-activity relationship is only one of those which can lead to a site location choice, because also ideological criteria do exist, and have got the same

importance. They can be untied from or even contrary to practical exigencies, depending instead on religious, social, political, juridical statements.

The existence of these further reading keys, as much useful to reach an explanation, seems to enlarge our disposable instruments. It gives some different, equally potentially valid, interpretative structures, without each of them prevailing a priori on the others.

“Environmental” interpretative approach becomes then a tool whose usefulness must be tested as made for the other approaches, base on their turn of other interpretative schools, like structuralist archaeology or Marxist archaeology⁵ ones.

In any case, the attempt to quantify human evaluations without giving up, simply for considering them too accidental or imponderable⁶, precedes the hypotheses about what kind of factors led evaluations themselves. In other words we think a imponderable component always exists, in every human choice, but it’s almost always reduced enough to be ignored, or anyway its presence and invaluableness don’t impair our possibilities of identifying and quantifying the other logical-pragmatical reasons the human behaviours are based on.

3. GIS Use in Human Behaviour Analysis

A little while ago we briefly exposed the basic considerations of a particular approach to the ancient settlement study: we called it “environmental”, referring to the will of describing, quantifying and explaining subtended criteria of human choices, considering them as a conscious interrelationship between environment and behaviours. Surely there isn’t a lack of available modern instruments for this quantification: statistic softwares and GIS are the best examples. Anyway, the application of a quantitative approach obviously requires previous phases before softwares employment: as we have already stressed in a different seat⁷, computer analysis phase mainly corresponds to a data “improvement”, in other words, to a data re-processing in a more easily interpretable form. It is however preceded by a fundamental phase during which we assign significance levels to raw available data, and another important phase during which data are selected and gathered according to this same significance. Then, computer data processing is followed by the real interpretation, where data are converted in historical information, according to the epistemological structure we have chosen.

But it’s self-evident that GIS and statistic softwares are only tools, and it wouldn’t be worthwhile to underline it anymore, if not for introducing to a formalization of what we tried to do here by using them: to employ a GIS in order to quantify and verify a settling concept relating to the landscape.

SIT has been practically used for quantitatively and spatially “translating” a choice-criterion perceived and elaborated by man: in this case this is the marginality.

To quantify marginality needs first of all to define it in a culturally and historically coherent way: this concept definition goes therefore through a necessary knowledge of the culture that expresses it in this particular case. We are in the central centuries of Italian Middle Age (11th–13th centuries), in an area that by itself could be held marginal,

even though we know it has been however densely populated. The landscape is mountainous, covered by woods, crossed by a scattered, approximate, uncomfortable road net; “facilities centers⁸” are represented by an abbey, by three curtes and by some small fortified villages. The chiefly agricultural-silvi-pastoral economy of each settlement, characterized by the use of rudimentary techniques, feels the effects of local environmental conditions, as climate (tied up to altitude and to slopes exposition) and morphology. The grounds quality and the water presence are instead more uniform.

In a similar situation we could define marginality in two different ways: as a longer than the average distance between settlement and facilities centers, or as a settling in an agriculturally more disadvantaged than the average area. In this quantification, besides the mean values relating to the whole known settlements group, the values got by parameters about facilities centers and their nearest places are surely meaningful too: the average is indeed a quite abstract index, although not totally, since it comes from measurements of real behaviours, while the values related to each non-peripheral settlement exactly quantify defined settlement choices.

What we have to do now is then to measure every single factor that defines marginality in each settlement, in order to reach its “spatial description”. We will first of all quantify the distances, by expressing them in cultural terms⁹ instead of objective terms. It means that the computer processing measuring them on DEM landscape representation does not finish with measurement effected by the software: a kilometric distance, or even a cost/distance relationship measured by computer, an inclination, an orientation are indeed objective factors relating to a landscape, but not to its estimation elaborated by men, whose value, in our case, is negligible. What we are concerned with is not indeed the reality measured by GIS, but the perception of reality that men we are studying got by their cultural filter. For example, we could talk just about the distance, one of the main factors whose valuation is influenced by culture: from one side, in a modern society, we have available means of transport for travelling really farther and faster than in the Middle Age. Therefore, kilometric distance is for us a lesser impediment than it was in the past. But, on the other hand, we are less used to move ourselves on foot through impassable terrains, where we were forced to do it; and our lifestyle badly agrees with this travel technique, that was instead the most usual a thousand years ago. Then, once GIS has “described” the distance or the cost/distance according to its algorithm of a 3D landscape model analysis, we have to assign to descriptive values the significance of real difficulty medieval farmers could perceive. Standard softwares we use have not been specifically conceived for humanistic studies on ancient times: they have been projected by technicians who have reproduced geographical phenomena according to their own modern perception, connected to the current industrial mechanical culture. So they are not fit for simulating evaluations in different interpretative keys. These keys must be identified, valued and inserted as numeric variations of the software measurements, so that the standardized and then non-realistic reading could be modified looking for a higher fidelity to historical phenomena we are interested in.

4. A Hypothesis to be Verified

Technically the possibility of quantitatively identifying marginality is based on the comparing of numerical behaviours its parameters have among several places. In our case, it has been effected only among two groups of places: the first one includes the most ancient reference sites, that were surely non-peripheral, because they themselves were the center of this territory. The second one is referred to a group of sites whose place-names made us think they were peripheral ones. We have therefore used a quantitative comparing as a test to verify the hypothesis according to which the second group is more peripheral than the first.

In detail: we have four available documents about territories that were under the civil jurisdiction of Frassinoro (Mo) Benedictine Abbey, founded in 1071. These documents inform us about toponyms and demography of localities existed between 1173 and 1220. We have another source, about a century later: it is the list of manenzie belonging to abbatial territories, dated 1320. Then the documentation about Middle Age stops. For the present times the best and almost exhaustive toponymic source is represented by 1:25000 scale CTR cartography, present for territories in hand also in a sensing dating back 1932. The systematic counting of localities, hydronyms, oronyms and districts present on the maps allowed to identify a total of 489 local names.

We found fourteen of them deriving from the word “ronco”: this term defines an agricultural tool, ronco or roncone, mainly used for the cutting of brushwoods. The usage of ronco, indicated by the verb runcare, would have become of

medieval common use to broadly point out also the action of setting cultivations in places firstly considered wild. The toponyms deriving from this term may then show places that have been cultivated after a near pioneering action which, starting from more ancient populated centers, saw the agriculture birth in new territories previously considered marginal¹⁰. Places having this name should be the result of several phases of settling spurs and of territorial exploiting expansion: that is an important historical phenomenon.

We have this way tried to verify, by using a GIS and statistic softwares, if “ronchi” environmental characteristics were compatible with the expected ones, if they had really been peripheral sites in the meaning we defined. We said indeed we suppose “ronchi” were chiefly agricultural settlements; if it’s true they should have quite advantageous locations from an agricultural point of view. Anyway, the choice of areas to be settled would not have been optimal, because these sites bore when abbatial territories already presented a quite dense settling-net, oriented to an agricultural economy too. In other words the still empty seats, less advantageous than the former ones, would have been occupied.

In order to verify this hypothesis, landscape aspects we have to consider are those that influence the agricultural potentials of a territory. Among them morphology, exposition, climate, soil typology are maybe the main ones; they obviously have not to be measured referring to the present, but after we have valued their variations since the studied period.

From a technical point of view, analysis procedure is split in two phases: the first one employs GIS for territorial data processing, in order to estimate the cumulative agrarian value, that is obtained by algebraically adding territorial values of each “ronco” and 13th–14th century locality, referring to the

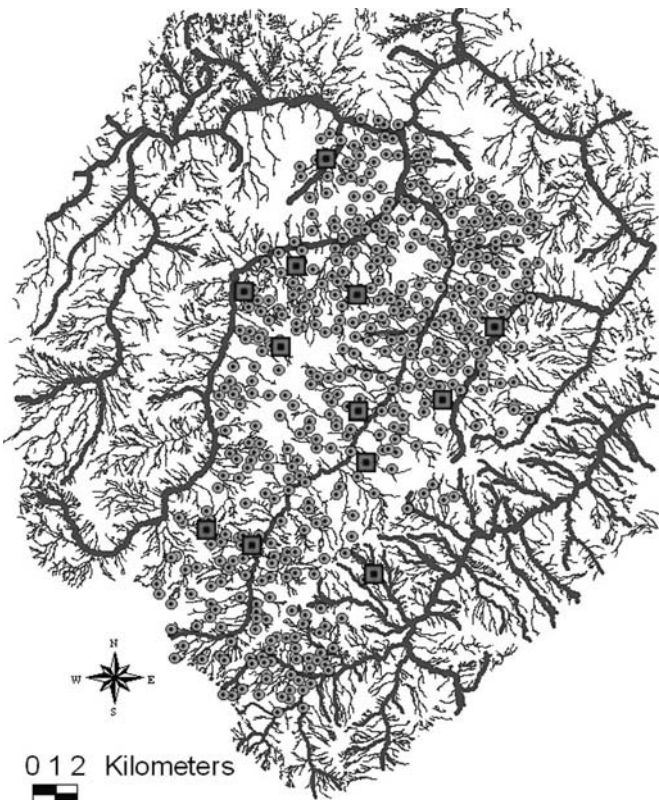


Fig. 1. The territory object of research: red squares show the location of “ronchi”, while green dots point out all the other places noticed on IGM cartography.

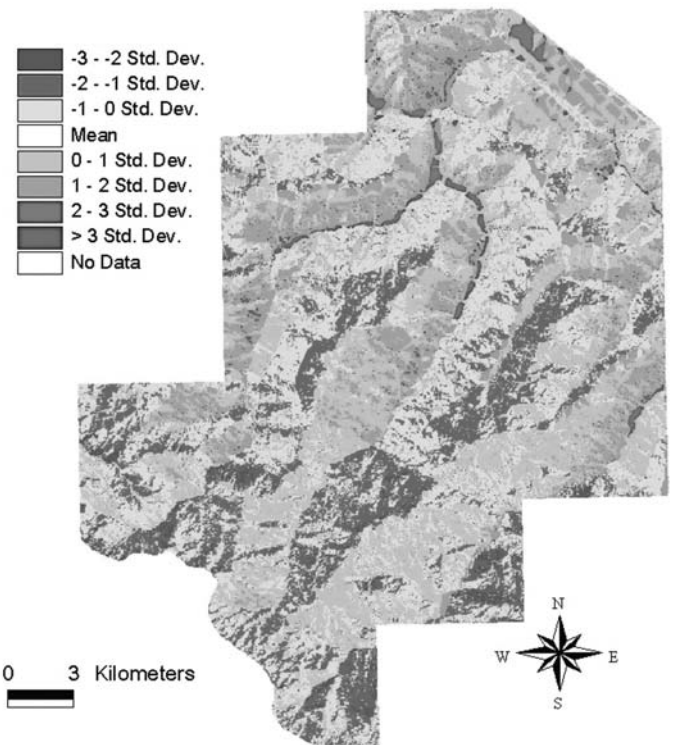


Fig. 2. The territory evaluated according to its marginality: space is more marginal as we move from red towards blue.

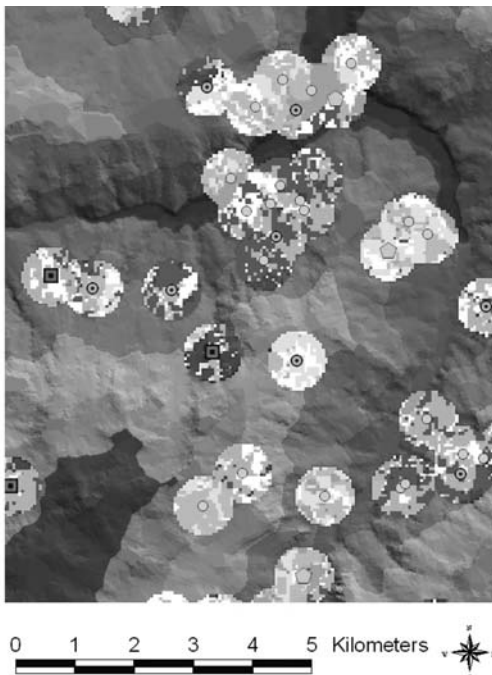


Fig. 3. Map detail which points out circular areas around the studied sites: it is possible to see TCF colors/values that define the areas themselves.

four evaluation parameters. For each site we studied a 500 meters radius area around the site itself, which should not represent its supply basin, but rather the most lived and perceived portion of space.

Two informative levels are the result of this proceeding: one concerning “ronchi” and the other relating to 13th–14th century localities. The two tables the second analysis phase is based on are connected with them. Tables show in the first field the univocal code of each tasseled cap feature in which GIS divides any territorial area, and in the second one the agrarian value of each of them. At this point, using the statistic software, we worked out a simple diagram which compares the curves obtained by putting in abscissa the number of tiles of each agrarian value group (i.e. 16 tiles having 12 per value, 25 tiles having 44 per value, and so on) and in ordinate the agrarian values of each group.

The two curves (it really consists of very short segments broken lines) allow to compare TCF quantity for each group of value with highest values and respective values in every corresponding point of the curves themselves. By comparing, it is possible to see that in every point 13th–14th century localities curve overcome of some value units the trend of “ronchi”. It means that all the little areas forming 13th–14th century localities territories are slightly more advantageous than “ronchi” ones. Finally, the simple average of TCF values underlines this superiority: the average relating to 13th–14th century localities is 41,49, while the one relating to “ronchi” is 35,38. According to the overmentioned data, it should be therefore possible to affirm that “ronchi” environmental conditions were really more disadvantageous than more ancient sites ones. That could confirm our hypothesis: “ronchi” represented a kind of settling expansion phenomenon, started from an already occupied “center” to a “periphery” previously neglected for having been considered less advantageous.

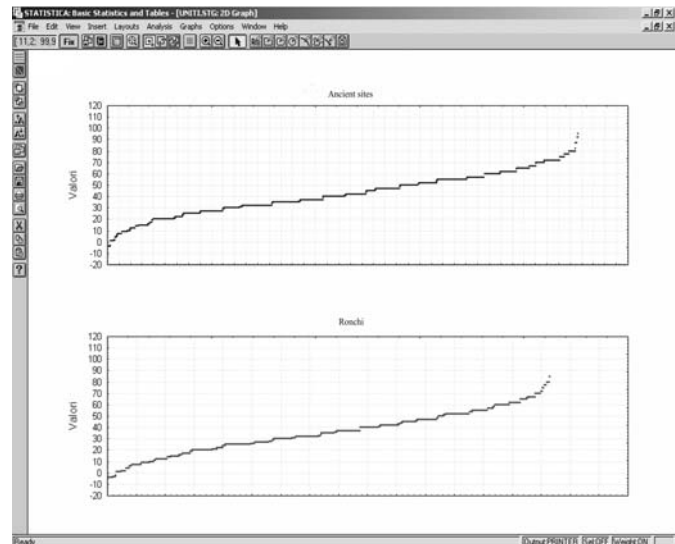


Fig. 4. Diagram trends which compare quantifications referred to marginality of “ronchi” and of the most ancient sites. The curves are similar, but the values of “ronchi” are wherever slightly lower.

5. Conclusions

Have we succeeded in using a GIS to identify, to represent, to measure and to analyze a spatial phenomenon culturally perceived by men of the past? We do not pretend here to positively answer this question, but we are rather fond of thinking we are on the right way to do it in the future. The road, in our opinion, is traced. Softwares support us better and better, by their increasing “spatial analysis” functions, but we must be careful: these “analyses” they do are objective, non-cultural, mechanical. Then, they perfectly manage how much in numerical data, but they do not hold in any consideration how, in other words the value that objective measurable data can assume in different cultural ambits. Neither they enlighten us about the why, the explanation of phenomena. The aim we the archaeologists have to reach is then to understand these influences, given by interactions between cultural contexts and environmental contexts, in order to be afterward able to quantify them in the correct way – awry of computer procedures – and eventually to explain them.

Notes

- ¹ For a panoramic view see Vagaggini and Dematteis 1976, p. 3 and followings.
- ² Among this scholar’s several studies we notice Ingold 2001.
- ³ For this branch of archaeological studies still remains of primary importance, as a synthesis, Cambi and Terrenato 1994.
- ⁴ The bibliography about analytic-quantitative approach in archaeology is vast and chiefly concerns Anglo-Saxon school’s territorial studies. We briefly remember here only the “manifesto” of this current, due to new archaeology too, that is Analytical archaeology by David Clarke (Clarke 1968).

- ⁵ A panoramic view of these and other epistemological schools in Giannichedda 2002.
- ⁶ Although we recognize post-processual ideas have to be seriously considered and they are a useful memento of imponderable everlasting presence in human behaviours, we do not belong to this school.
- ⁷ In Monti forthcoming.
- ⁸ Geographically intended as places that have organizing and managing functions and where elsewhere unavailable goods and services can be found.
- ⁹ In other words, not in terms of kilometric distances, but in terms of cost/distance, where the cost is estimated (in this case, for simplicity, quite empirically), according to habits, resources and capabilities we suppose the inhabitant of these territories had.
- ¹⁰ For historical aspects concerning the term “ronco” see Sereni 1961, pp. 107–109 and Fumagalli 1992: 38–43, while for merely toponymic aspects see Pellegrini 1990: 199.

References

- Binford, F., 1990. *In Pursuit of the past: Decoding the archaeological record*. London, 178.
- Cambi, F. and Terrenato, N., 1994. *Introduzione all'archeologia dei paesaggi*. Roma.
- Clarke, D., 1968. *Analytical archaeology*. London.
- Giannichedda, E., 2002. *Archeologia teorica*. Roma.
- Ingold, T., 2001. *Ecologia della cultura*. Roma.
- Fumagalli, V., 1992. *L'uomo e l'ambiente nel medioevo*. Roma-Bari.
- Monti, A., forthcoming. Tecnologie informatiche nell'analisi e comprensione dell'insediamento antico: considerazioni su statistica, gis e simulazione, *International Symposium on Learning and Tecnology Development in the Information Internet Age. The convergent paths of Public and Private Organizations, Bologna – Forlì 21 – 22 Novembre 2002*.
- Pellegrini, G. B., 1990. *Toponomastica italiana*, Milano.
- Sereni, E., 1961. *Storia del paesaggio agrario italiano*. Roma-Bari.
- Vagaggini, V. and Dematteis, G., 1976. *I metodi analitici della geografia*. Firenze.