ЗАБРУДНЕННЯ, ОХОРОНА ТА ВІДНОВЛЕННЯ ҐРУНТІВ

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B. Lozano, L. Parras

ERODIBILITY EFFECTS IN MEDITERRANEAN ACID NATURAL AREAS

Б. Лозано, Л. Паррас

Университет Кордови, Испания

ЭРОЗИЯ КИСЛЫХ ПОЧВ СРЕДИЗЕМНОМОРЬЯ, НЕ ЗАТРОНУТЫХ ДЕЯТЕЛЬНОСТЬЮ ЧЕЛОВЕКА

Сопоставлены два вида эрозии почв, одна из которых вызывается чрезмерным увлажнением, а вторая, потенциальная, отрицательными эффектами, влияющими на почвы естественных горных заповедников Кардены и Монторо. Отмечено влияние эродированности почв и их потенциальных характеристик на уровень потерь при эрозии. Изучена степень влияния каждого из всех потенциальных факторов, играющих роль в развитии эрозийных процессов. Были определены условия, при которых эти процессы проявятся максимально (зоны повышенной эрозийной чувствительности).

Ключевые слова: эрозия, эродированноть, осадки, Средиземноморье.

B. Lozano, L. Parras

Universidad de Córdoba, España

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In this work we establish a comparison between soil erosion by water and potential soil erosion under negative situations in Natural Park Mountain Ranges of Cardeña and Montoro soils. We obtain the influence of soil erodibility and potential cropping and management in soils losses. We study the weight of each one of the potential factors in the calculation of total potential erosion, thus we determine the more sensible zones in relation with erosion to order the best use in these zones. As a result we obtain that potential vegetal cover is the factor which produce the greatest increase in potential soil losses.

Keywords: Erosion, Erodibility, Rainfall, Mediterranean.

The Natural Park Mountain range of Cardeña and Montoro is in the Southeastern of Spain, located between the coordinates 38º 4'–21' y 4º 9'–24'. It was declared Natural Park by the law 2/1989 on the 18th of July in Andalusia.

The soils are developed on acids litologies. The relief is steep (with slopes between 17 % and 31 %) when the original material is slates whereas on granites the relief is ridged (with slopes between 3 % and 16 %). The soils are acid (*pH* 5–5,5), and high or very high a saturation in bases (60–80 %) (Lozano, 2003). The different environmental conditions favor the ground diversity, most abundant are Leptosols, Cambisols, Regosols, Fluvisols, Luvisols and Phaeozems, after FAO classification (1998).

MATERIAL AND METHODS

The estimation of the rainfall soils erosion of the study zone has been carried out in agreement with the criteria of Wischmeier & Smith (1965), expressed in USLE (Universal Soil Loss Equation).

The rates of loss of soils in tons per hectare and year (A) have been obtained from the product of the erosivity rainfall data (R), soil erodibility (K), slope length and steepness factor (LS), cropping and management (C) and support practices (P), obtained for each one of the Environmental Units defined by the authors in the Park.

A classification by erosive levels has settled down for the direct and easily intelligible use of the data (Table 1), with a reduced number of intervals. The limits of the erosive levels that have been applied correspond to the established ones by ICONA (1987), for the hydrographic river basin of the Guadalquivir (Table 1).

Table 1

Erosive levels by ICONA 1987

Level	Losses, t ha^{-1} yr^{-1}	Degree
1	1–5	Insignificant
2	5,1–12	Very low
3	12,1–25	Low
4	25,1–50	Moderate
5	50,1–100	High
6	100,1–200	Very high
7	> 200	Irreversible (lítica phase)

The criteria of Sanchez J. (1995) have been used to do the cartography of the potential erosion, based on the method that was applied to the Geoscientific Cartography of Valencian Community 1:200000 (Cendrero, 1986).

The equation used for the calculation of the potential erosion risk is based on the Universal Soil Loss Equation (Wischmeier & Smith, 1965), but considering like potentials factors the potential soil erodibility (K'), potential cropping and management factor (C') and P' that is the non existence support practice. The formula used is

$$A' = R\,K'L\,S\,C'P' \quad (1)$$

Besides to calculate the potential erosion considering like potential factors K', C' and P' the influence in the increase of the rates of loss of ground has been determined of each one of them separately, defining this like A'2 in case the only potential factor is the potential soil erodibility, A'3 when it is the potential cropping and management and A'4 in the case of doesn't have support practice. The expressions therefore are those that follow:

$$A'_2 = RK'CPLS \quad (2)$$

$$A'_3 = RKC'PLS \quad (3)$$

$$A'_4 = RKCP'LS \quad (4)$$

RESULTS AND DISCUSSION

After the application of the Universal Soil Loss Equation to the Environmental Units, it is obtained that the value of A is very variable, varying from 0 t ha^{-1} yr^{-1} in the zone of the Yeguas river to 1170,50 t ha^{-1} yr^{-1} in the most humanized than is those delimited like firebreak.

As result of this classification it's observed that the studied zone doesn't have serious problems of soil erosion, only a 2,2 % of the Environmental Units have values soil loss superior to 50 t ha^{-1} yr^{-1}, a 4,6 % has a rate soil loss Moderate (between 25,1 and 50 t/ha^{-1} yr^{-1}) and the majority Environmental Units (93,2 %) have a value of soil loss below 25 t ha^{-1} yr^{-1}, a Low degree of erosion, Very Low or Insignificant (Map 1).

The comparison of these results with those of the potential erosion A' (Map 5) and of the variants of the same one considering like potential an only one factor A'2, A'3 and A'4 (Maps 2, 3 and 4) it's possible to be done from table 2.

Table 2

Percentage distribution of the UUAA in the different erosive levels in A, A'2, A'3, A'4 y A'

Degree	A	A'$_2$	A'$_3$	A'$_4$	A'
Insignificant	47,7 %	38 %	22,2 %	35,7 %	8 %
Very low	29,9 %	31,2 %	16,4 %	31,4 %	13,9 %
Low	15,6 %	20,6 %	20,8 %	22,5 %	17,8 %
Moderate	4,6 %	7,7 %	21,2 %	7,8 %	25,3 %
High	0,8 %	1,1 %	11,5 %	1,3 %	22,8 %
Very high	0,9 %	0,9 %	7,4 %	0,6 %	11,2 %
Irreversible	0,5 %	0,5 %	0,5 %	0,7 %	1 %

In the table 2 can be observed like for the calculations of A'2, A'3 and A'4 diminishes the percentage of Units in the Insignificant level, it stays in the Very Low level and begins to increase for the levels Low and Moderate. In the higher levels almost they aren't change. In the case of A' a considered reduction in both first levels takes place, maintenance in third and a considerable growth in the rest.

CONCLUSIONS

With respect to the rate of loss of soil (erosion), most of the Natural Park has soil losses minor than 25 t ha^{-1} yr^{-1}, not undergoing therefore serious problems of erosion, due to low values of LS and C factors.

After the calculation of A'2 and A'4, using as potential factor K' in the first case and P' in the second, are observed slight increases in the low levels of erosion, being the increase of the soil loss rates insignificant for the high levels.

Nevertheless, in the case of A'3 (the potential factor is C'), a considerable increase in all the levels takes place.

When the total potential erosion it is calculated, A', takes place a considerable increase of the erosive rates. After the calculation of the erosion most of the Environmental Units they had losses of soil smaller than 25 t ha^{-1} yr^{-1}, whereas when applying the potentiality criteria that majority happens to have superior rates to 25 t ha^{-1} yr^{-1}.

So that these results at the time of introducing modifications in the uses are due to consider, since the present situation as far as the rainfall erosion is good, but this situation could turn towards a very negative state according to as they are the affected elements of means in the change.

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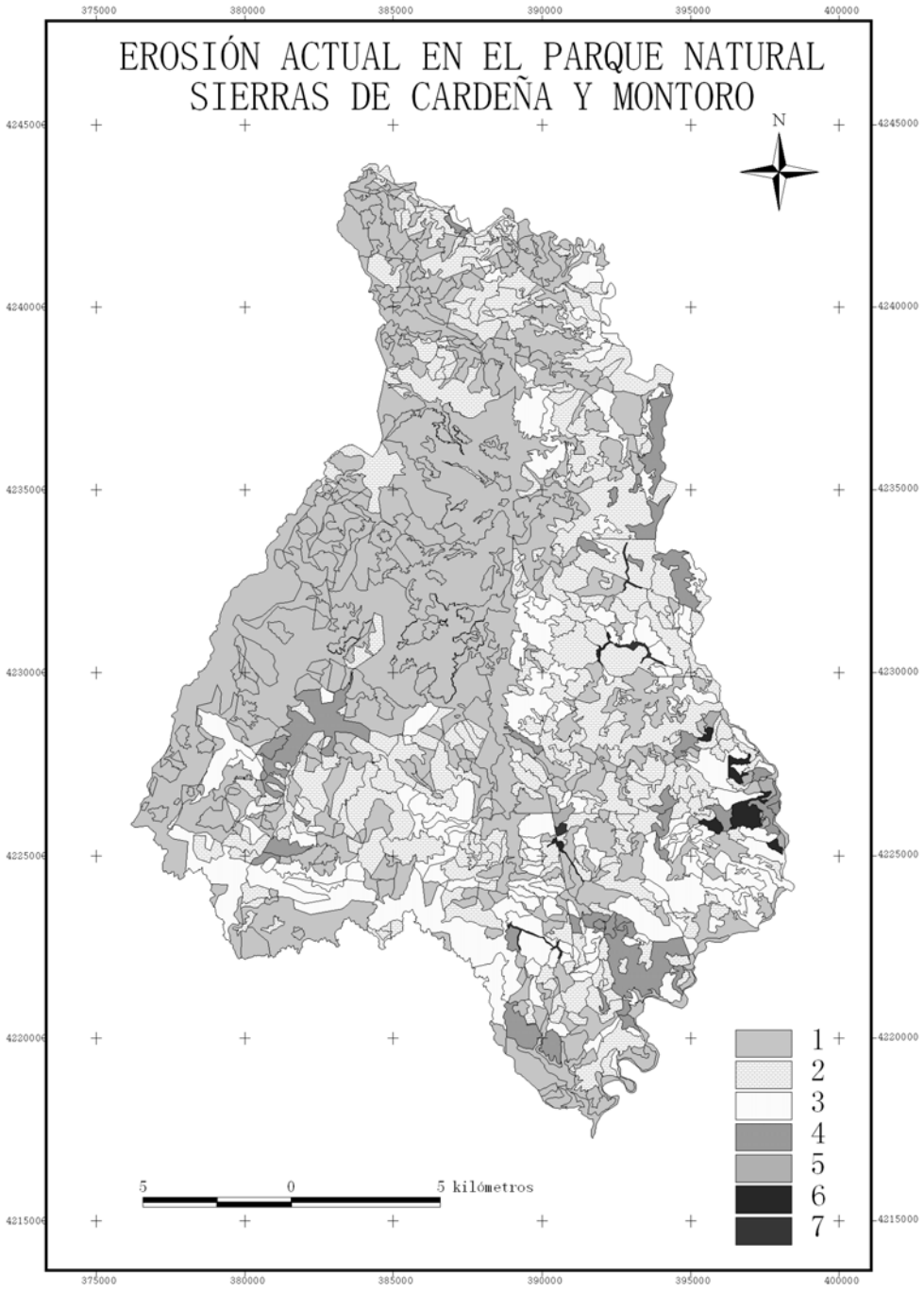
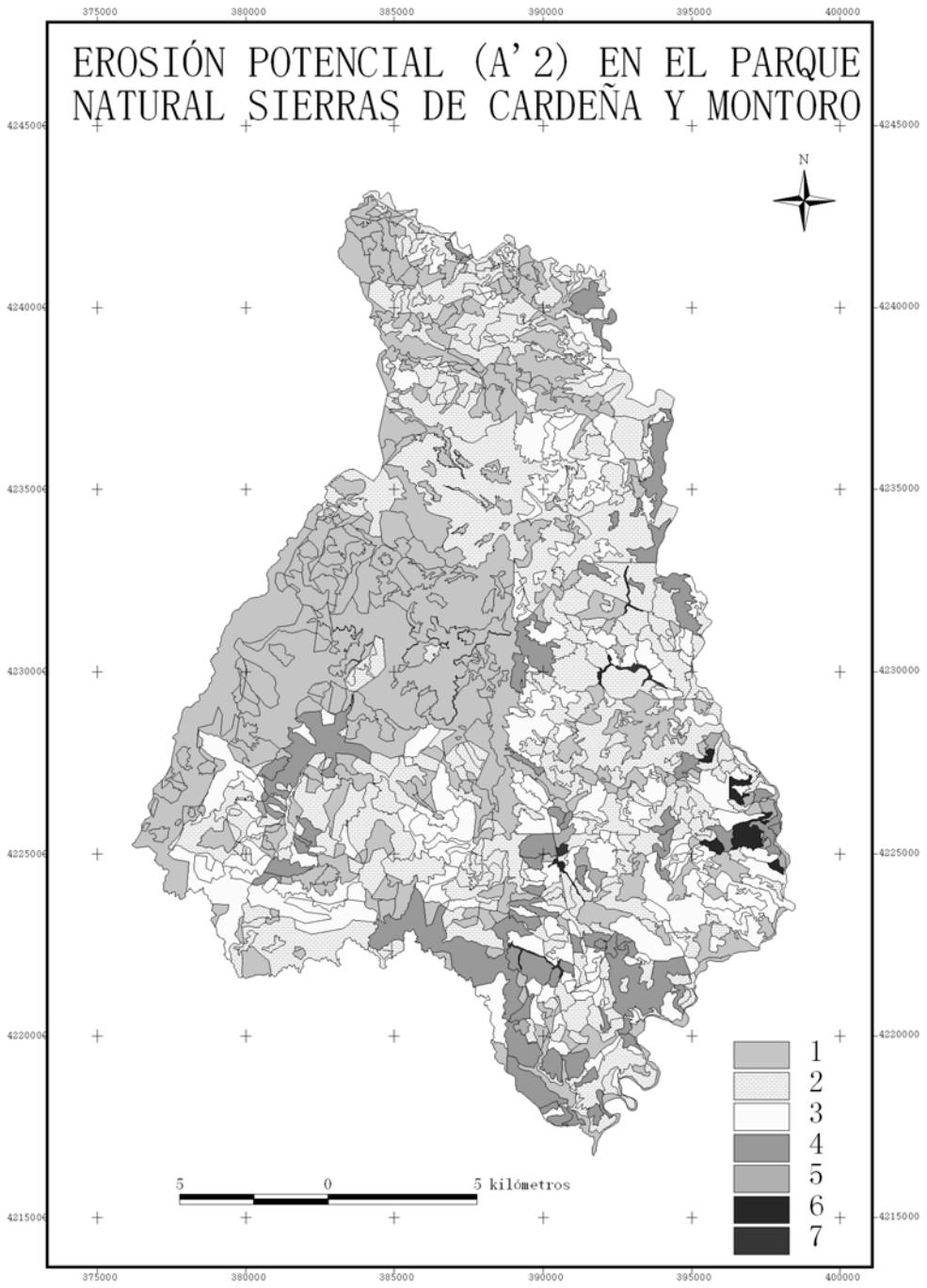
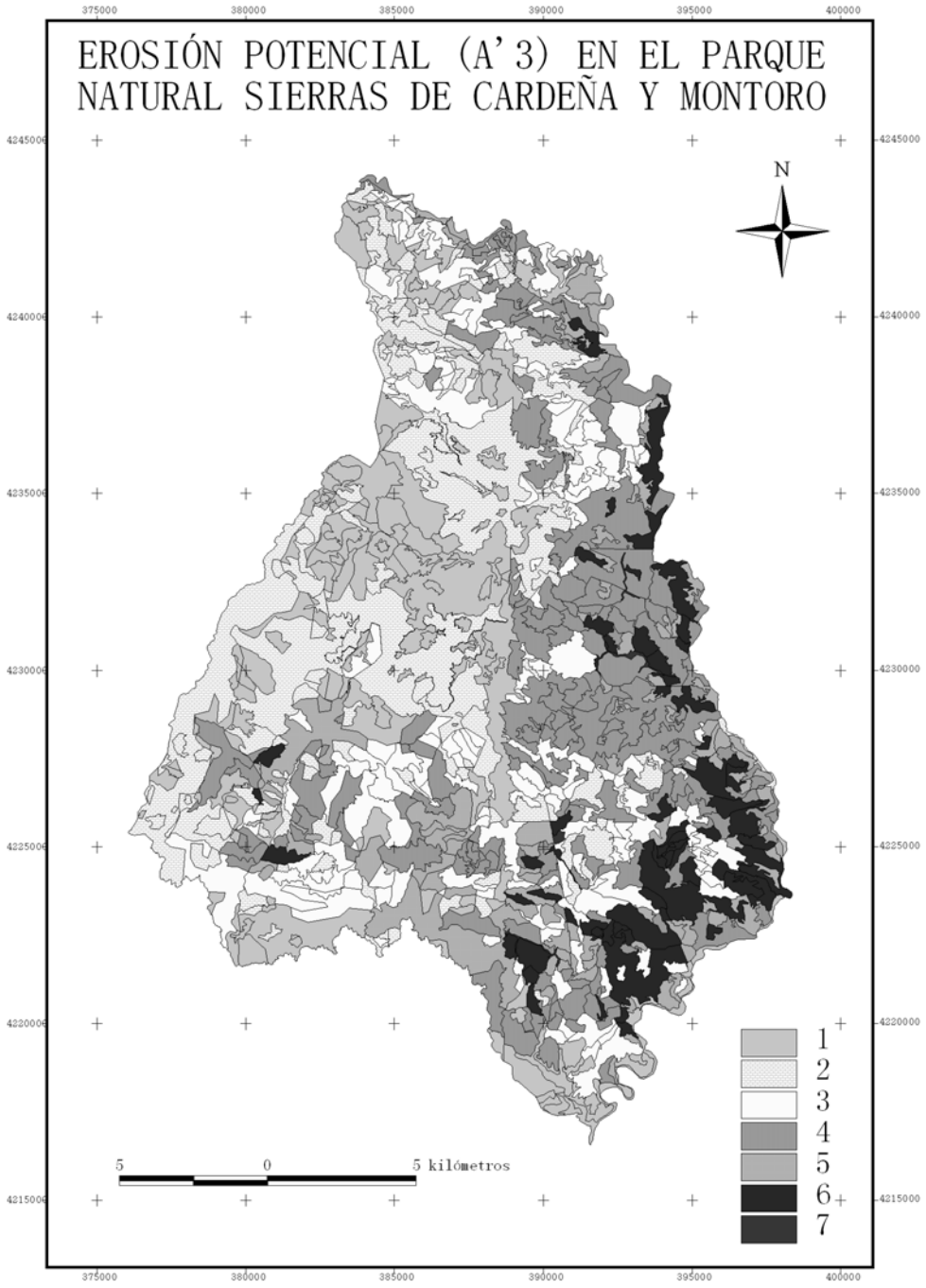


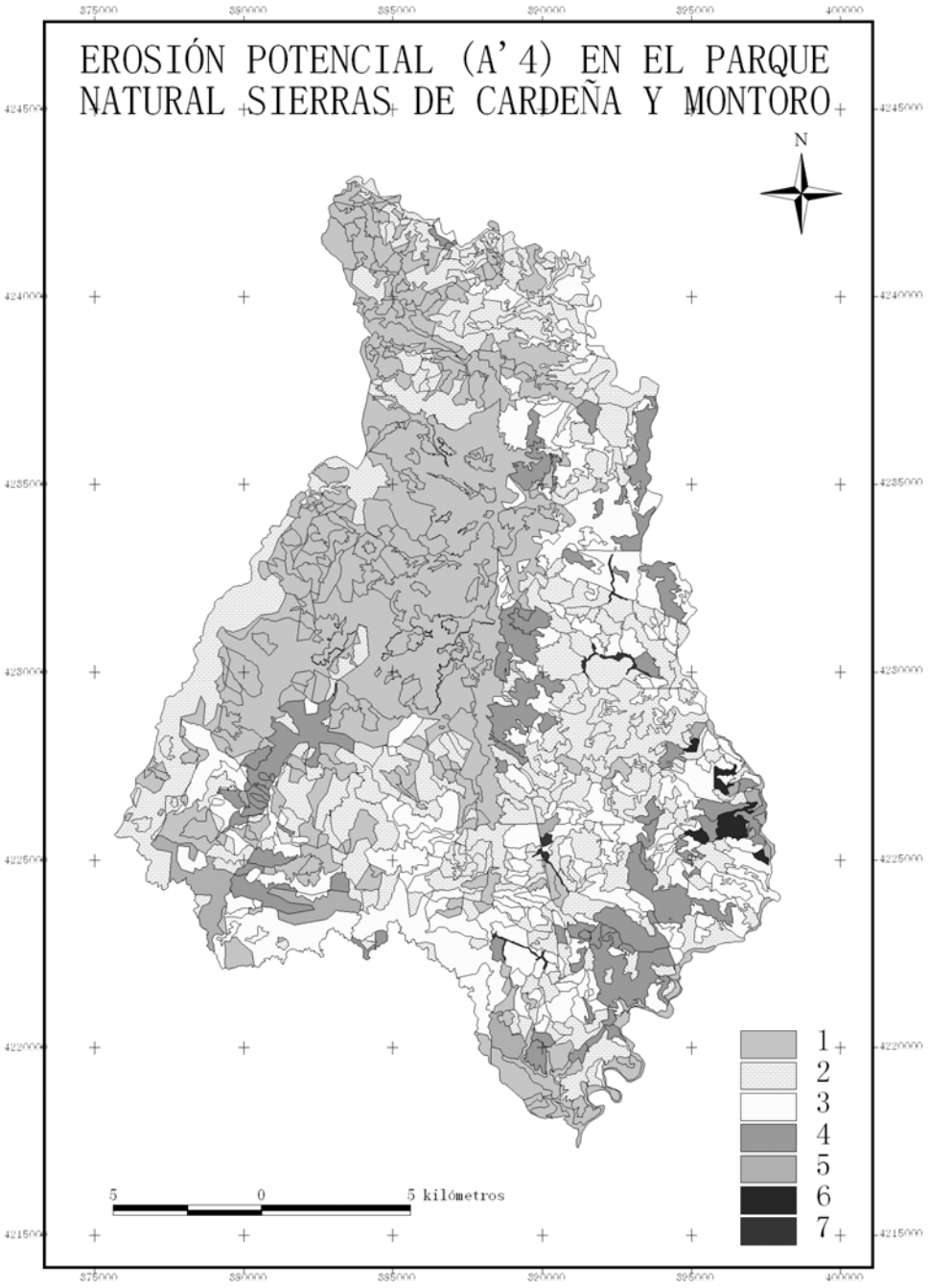
Map 1. **Erosión Levels (A)**



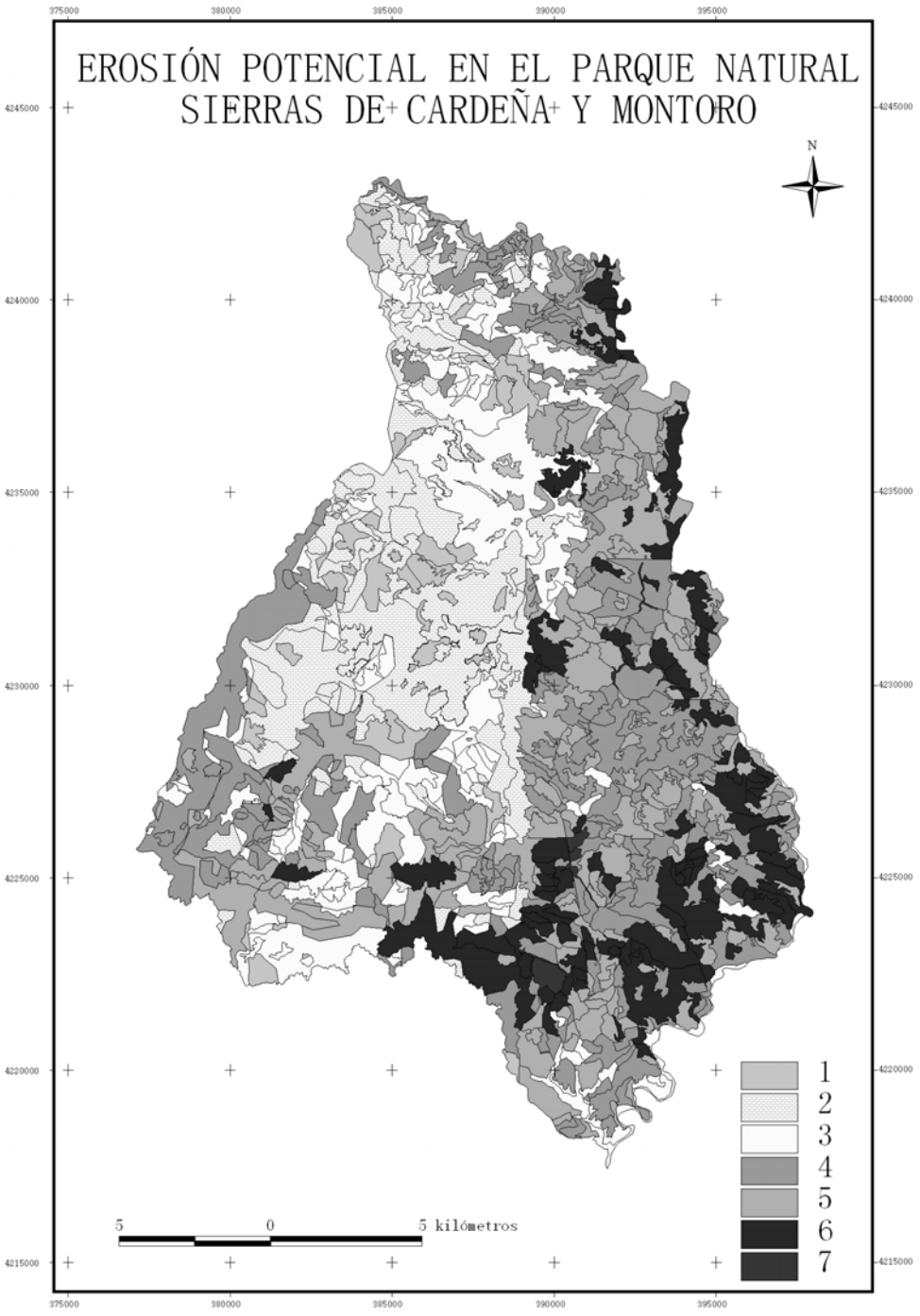
Map 2. **Potencial Erosión (A'_2) Levels**



Map 3. **Potencial Erosión (A'3) Levels**



Map 4. **Potencial Erosión (A'4) Levels**



Map 5. **Potencial Erosión (A') Levels**

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