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E.S.S.C.

EUROPEAN SOCIETY FOR SOIL CONSERVATION

E.S.S.C. NEWSLETTER 2 / 1996

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THE EUROPEAN SOIL BUREAU

Soil is one of the essential elements of the biosphere which necessitates a global policy for management, evaluation and conservation (Borlaug & Dowswell, 1994). To implement such a policy, it is necessary to have information harmonised both in space and time (ISSS, 1988).

The European Commission is the originator of several programmes aiming to acquire soil data (CEC-JRC, 1995). Associated with other sources of information (water, air, land management) these data are a valuable aid for decision support processes, in particular for the control of agricultural production (Vossen & Meyer-Roux, 1995), land management and environmental protection (Blum, 1990).

One of these programmes, MARS (Monitoring Agriculture by Remote Sensing) initiated the development of a geographical database for soil cover at an accuracy of 1/1,000,000 scale (Meyer-Roux, 1987). The Support Group "Soil and GIS", bringing together experts from different EU countries, has proposed a methodology and constitutes a scientific network for the acquisition and exchange of information (Burrill & King, 1993). The advantages of this Group include their contact with the abundance of national and international studies. These aspects also highlight the absence of coordination not only between countries, but equally, and to the same degree, between different Directorates-General of the Commission.

The Soil Information Focal Point (SIFP) was set up at JRC Ispra in 1994. Following the work and initiatives stimulated by the EEA Task Force, its mission was, on the one hand, to manage information elaborated at the 1/1,000,000 scale and on the other, to organise thinking on the Commission's future needs for soil data.

Three initiatives have been identified:-

1) The creation of a coordination group from the Directorates-General of the Commission (Inter DG Group) which includes the European Environment Agency (EEA).

2) Support for a second meeting of Heads of Soil Surveys and those responsible for management of databases in the EU (CEC, 1991a).

3) The creation of a working group termed "Soil Information System Development" (SISD) bringing together experts in soil science and information systems.

The Inter-DG Group has produced a report identifying the demand for soil information from the Commission (CEC-JRC, 1995). The report highlights the large requirement for soil information, both within the Commission and in external institutes and organizations. The requirement is presently expanding due to an increased focus on environmental issues and sustainable planning. However, much of this need is presently unmet. The required information is either non-existent, exists only at an unsuitable resolution, or is available only as incompatible and/or incomparable datasets from national (or regional) organizations.

The second meeting of the Heads of Soil Survey and those responsible for management of databases in the EU was held in Orléans in December 1994. Main recommendations of the meeting were (EC, 1996) the support for the ongoing process of updating the European geographical and analytical soil database corresponding to the 1:1,000,000 scale, the establishment of the Soil Information System Development working group, the need for a more detailed database in Europe at scale of 1:250,000 and the creation of an European Soil Bureau.

The Soil Information System Development working group produced in 1996 an important policy paper entitled "European Soil Information Policy for Land Management and Soil Monitoring" (King & Thomasson, 1996) that sets guidelines for the future European soil information policy. It recommends the creation of an European Soil Bureau.

Following these recommendations, the Commission has established, within the Joint Research Centre, Space Applications Institute, at Ispra (Italy), a special unit called European Soil Bureau (ESB). It will carry out scientific and technical duties in order to harmonize soil information relevant to Community policies, its relevant General Directorates (DGs), to the European Environment Agency (EEA) and to concerned institutions of the Member States. It reinforces the work which has been done in the frame of the Soil Information Focal Point (SIFP).

Various DGs, and more specifically DG VI, XI and XII, have funded some coordination tasks which were necessary for specific projects. For the past seven years, the Space Applications Institute through the MARS project in collaboration with DG XI has been active in developing a European data base on soils. There is a need for insured continuity and better involvement of the Member States and their specialised bodies in soil information, which should be achieved by the creation of an European Soil Bureau (ESB).

The Bureau is established at the JRC Space Applications Institute within the Agriculture Information System Unit. The capacities of the Bureau will be built up over several years with the intention to reach full capacity by 1997/98. Participation of detached National experts within the ESB should be encouraged. By 1997/98 the Bureau will be a substantial centre of excellence capable of undertaking an extensive range of scientific and technical activities.

The Bureau is constituted as follows:

1. A **Secretariat**. It co-ordinates and catalyses the activities of the Soils Bureau, providing technical support as required. It also provides logistic support for the other elements of the Bureau. It prepares guidelines or resolutions to the Advisory Committee.

2. The **Scientific Committee operating by small Working Groups**. These are set up by the Secretariat according to the specific themes needed to achieve the objectives allocated by the Advisory Committee or by the Commission.

3. An **Advisory Committee** from the Member States. It is composed of representatives named by each Member State, observers from neighboring countries and international bodies. It is charged with evaluating and advising the Bureau for its various duties.

The first meeting of the Advisory Committee was held the 13th of June 1996. The representatives of the EU Member States, the EFTA Member States and International Organizations reviewed the activities of the newly established European Soil Bureau. The policy documents (CEC-JRC, 1995) (King & Thomasson, 1996) were approved. Major recommendations of the Advisory Committee were:

- continuation of the on-going work on the updating the European geographical and analytical soil database corresponding to the 1:1,000,000 scale,
- importance of close collaboration with the newly established European Topic Centre on Soil,
- priority of information access issues for data distribution,
- endorsement of the project for a future 1:250,000 soil geographical database of Europe.

Following these guidelines the current activities of the ESB include:

- extension, upgrade, maintenance and distribution of the Soil Geographical Database of Europe at scale 1:1,000,000,
- development of an European soil data distribution policy,

- development of a Georeferenced Soil Database of Europe at scale 1:250,000.

Additional activities are foreseen for the near future and will be set up according to the guidelines set by the Advisory Committee and to the demands by the Commission.

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EVALUATION OF RAINSTORM PROBABILITIES FOR CONSTRUCTION OF EROSION PREVENTION MEASURES FOR UKRAINIAN SOILS

Soil erosion in the Ukraine takes place by runoff generated from both snowmelt and rainfall with rain-induced erosion causing the most damage. Erosion prevention measures based on engineering structures must be resistant to a certain critical load, ie. the power of the erosive stream. From this it is clear that if a construction stands up to showers of infrequent probability, it would stand up to flooding from snowmelt with rare exceptions. This follows because for flows of the same thickness, the one from rainfall would pass through the construction in a matter of one or two hours, while that from snowmelt would last for a few days.

Soil erosion is a stochastic process. Probabilities of its occurrence can be evaluated. This contribution is devoted to solving some of the problems associated with evaluating the probability of rainfall erosion using mathematical models.

The main methodological limitation lies with the spatial mapping of rainfall based on pointwise data; this causes the principal errors. The matter is worse when its evaluation is based on pluviographs. In the plains region of Ukraine, data for an individual pluviograph are representative of an area no larger than 1,000 hectares. But the majority of the stations here are not equipped with pluviographs; the network of stations is also insufficient. Setting up a system for recording precipitation using radiolocation methods would be a radical solution of this problem but this needs a large number of vehicles and qualified personnel, which is absolutely impossible today.

A method linking short series data to one long series data set that characterises precipitation for an area with similar rainfall conditions is more achievable. For the differentiation of the Ukrainian territory, the parameter K_{hm} has been used. The parameter was proposed by Schwebs (1974) and included in his mathematical model of erosion to characterise the erosive power of precipitation. Thirteen regions have been distinguished on the basis of K_{hm} values (Fig. 1) calculated for meteorological stations with 30-year data sets.

Somewhat unexpected results have been obtained. Thus, the greatest danger of rainfall erosion is indicated in the Steppe regions (K_{hm} = 1,000 - 2,800) and the Forest Steppe regions which border on the steppe. The maximum K_{hm} values (K_{hm} >1,500) occur on the south and east spurs of Pridneprovskaya Heith, west and south-west spurs of Priazovskaya Heith, the south spurs of Kodry, Tarkhankut Heith and the east foothills of Krimea. Minimum K_{hm} values are in the east of the

Ukraine (including Donetsk mountain ridge and spurs of Srednerusskaya Heith), Polesie and Karpathian foothills.

The values of the K_{hm} parameter are not correlated with other characteristics of rainfall for example maximum daily precipitation. Thus, K_{hm}, the use of which is well justified by experimental studies using rainfall simulation and by natural observations on the erosion experimental stations, characterises not rainstorm properties generally, but rains with a risk of erosion.

Hence, a map dividing the Ukraine on the basis of K_{hm} values which can be used for calculations of erosion with Schwebs' mathematical model has definite scientific importance.

However, some models of erosion require rainfall inputs in the form of pluviographs of rainstorms for defined probabilities of occurrence. An example is WEPP (Nearing et al, 1989). The K_{hm} map allows 13 rather uniform regions with similar rainstorm characteristics to be defined. For each region, the following algorithm is proposed:

1. Short data series from pluviographs from individual meteorological stations are integrated into one long series;

2. Maximum rainfall intensity I_{max} and maximum duration T_{max} for each region for different probabilities are determined. Quantiles of the I_{max} and T_{max} parameters which define the shape of the pluviograph are calculated. Other rainfall parameters (drop size, drop velocity, kinetic energy) are strongly correlated with I_{max} and T_{max} (Schwebs, 1984). Quantiles could be determined both analytically and graphically.

3. Relations such as:

$$(i / I_{max}) = f(t / T_{max})$$

are plotted for each region. These relations enable a "typical" pluviograph curve shape to be defined for a given probability. In our case two curve types - parabolic and exponential - were obtained.

An alternative way, suggested by Lavrovsky et al. (1985) is to express rainfall intensity as a normal distribution curve:

$$I(t) = I_{max} e^{-I_{max}^{1.5} \bullet (\frac{2.5t}{T} - 1)^2}$$

where I(t) = rainfall intensity during time (t).

It is known that the erosive efficiency of a rainstorm is determined by its pattern over time. Soil loss can differ tenfold or more depending on when the peak cell occurs: at the beginning, in the middle or at the end of the storm. This aspect is considered by parameters of the equations for each region and the probability of the rainstorm.

4. The pluviographs of "typical" rainstorms of given probabilities of occurrence are plotted on the basis of the equations obtained.

   The results of the calculations that have been made according to foregoing algorithm are presented in Table 1.

   The appropriate pluviograph for a "typical" rainstorm in the region is to be used in designing erosion prevention measures. It is considered that a construction is sufficiently reliable if it can stand up to a rainstorm of 10% probability. Pluviographs of "typical" rains of higher probability could be used to evaluate the efficiency of agrotechnical erosion prevention measures because, in our opinion, agrotechnical methods do not have sufficient engineering reliability and can be used only as additional measures. We can consider erosion defence reliable only if it stands up to a rainstorm exceeding 1% probability. Such reliability that would provide trouble free operation of the construction can only be achieved in several stages.

Seven pluviographs of "typical" rainstorms exceeding different probabilities were obtained for each of the 13 regions of the Ukraine, differentiated on the K_{hm} parameter. The accuracy of defining of direct rainfall parameters through the indirect parameter, K_{hm}, needs additional corroboration. The possibility of such verification arises from ordinal statistical theory (Anon, 1970; Blagoveshenskiy et al., 1983; 1987).

Practically, different rainfall quantiles are considered. For example, quantiles for region 1a are shown in Figure 2, plotting rainfall intensities (I) for "typical" storms of given probabilities of occurrence (α) against maximum duration expressed as a percentage. Similar plots for other regions were obtained to ensure that differentiated regions are really homogeneous regarding the danger of rainfall erosion.

The conclusions are:

1. The Ukrainian territory can be divided into 13 regions of different erosion risks.

2. Erosion risk can be evaluated quantitatively from the maximum intensity and maximum duration of rainstorms of different probabilities of occurrence.

3. Pluviographs of "typical" rainstorms for seven levels of probability for each region were obtained. These pluviographs could be used for mathematical and physical modelling.

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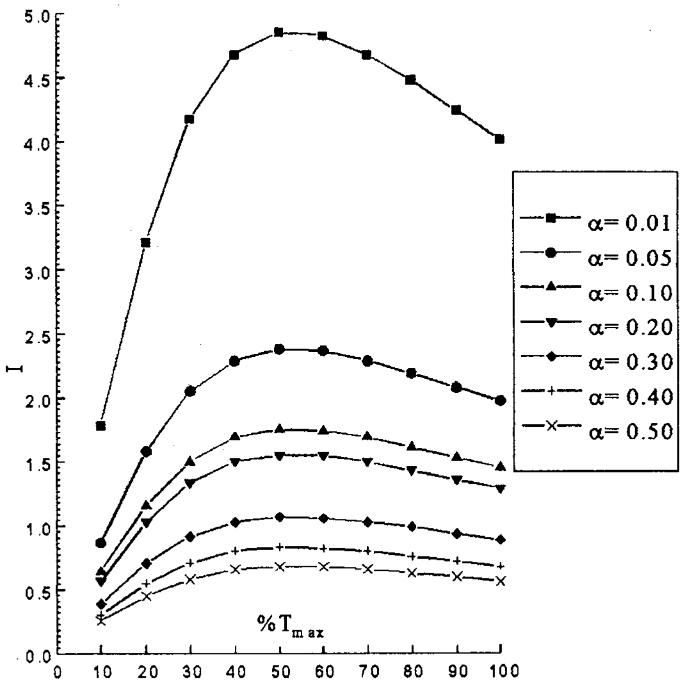
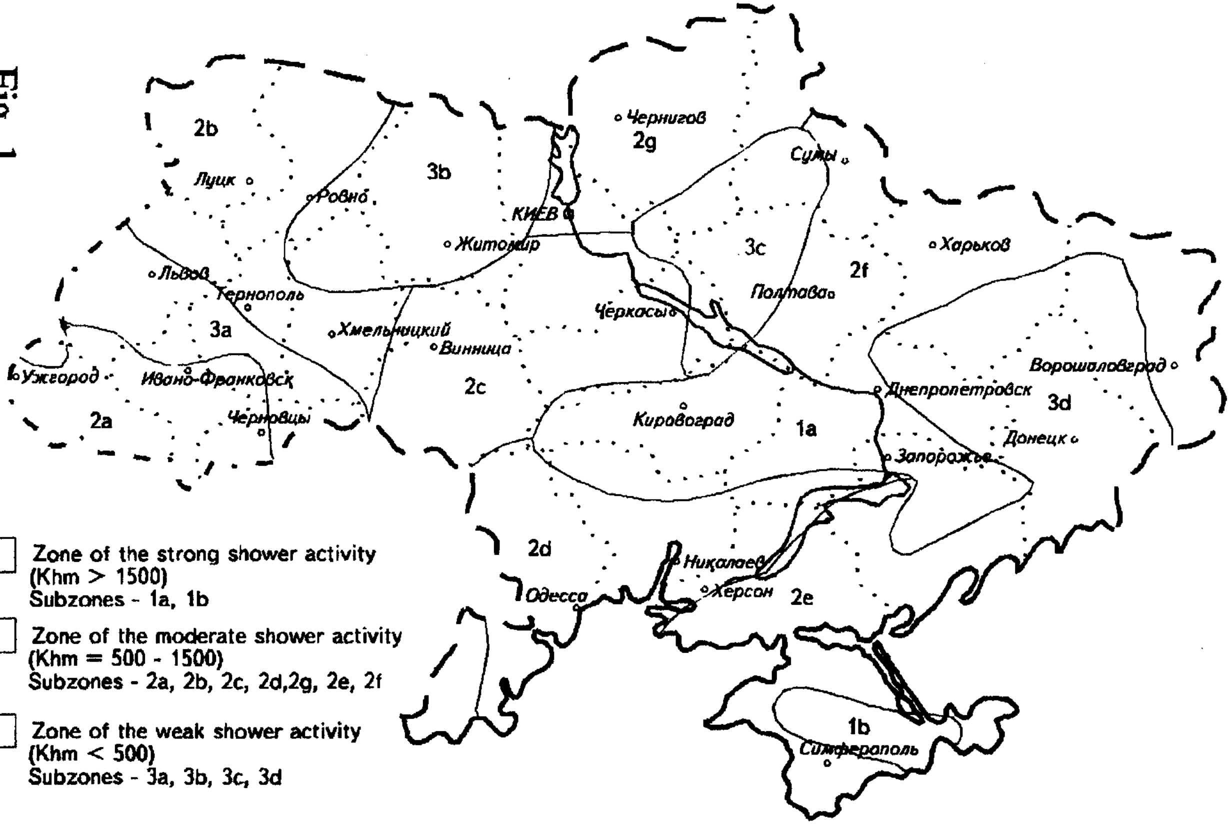


Fig. 2 Quantiles of "typical" rainstorms (1a region)

Fig. 1



1 Zone of the strong shower activity
(Khm > 1500)
Subzones - 1a, 1b

2 Zone of the moderate shower activity
(Khm = 500 - 1500)
Subzones - 2a, 2b, 2c, 2d,2g, 2e, 2f

3 Zone of the weak shower activity
(Khm < 500)
Subzones - 3a, 3b, 3c, 3d

Table 1
Parameters and curve shapes of "typical" showers of 10% exceeding probability

Region number on the map	Calculation formula	I_{max}, mm/min	T_{max}, min
1a	$i_t = \dfrac{1.03 \cdot I_{max} \cdot \frac{t_k}{T_{max}}}{(\frac{t_k}{T_{max}})^2 + 0.28}$	1.8	38
1b	$i_t = i_{max} - i_{max} \cdot e^{\frac{-1.1t_k}{T_{max}}}$	1.70	50
2a	$i_t = i_{max} - i_{max} \cdot e^{\frac{-5.2t_k}{T_{max}}}$	1.60	28
2b	$i_t = \dfrac{1.09 \cdot \frac{t_k}{T_{max}} \cdot I_{max}}{(\frac{t_k}{T_{max}})^2 + 9.30}$	1.40	30
2c	$i_t = \dfrac{1.32 \cdot I_{max} \cdot \frac{t_k}{T_{max}}}{(\frac{t_k}{T_{max}})^2 + 0.43}$	1.29	
2d	$i_t = \dfrac{1.11 \cdot I_{max} \cdot \frac{t_k}{T_{max}}}{(\frac{t_k}{T_{max}})^2 + 0.31}$	1.50	35
2e	$i_t = i_{max} - i_{max} \cdot e^{\frac{-3.0t_k}{T_{max}}}$	2.50	30
2f	$i_t = i_{max} - i_{max} \cdot e^{\frac{-3.0t_k}{T_{max}}}$	2.00	35
2g	$i_t = i_{max} - i_{max} \cdot e^{\frac{-3.9t_k}{T_{max}}}$	1.10	33
3a	$i_t = i_{max} - i_{max} \cdot e^{\frac{-3.0t_k}{T_{max}}}$	1.70	55
3b	$i_t = i_{max} - i_{max} \cdot e^{\frac{-2.7t_k}{T_{max}}}$	1.85	31
3c	$i_t = i_{max} - i_{max} \cdot e^{\frac{-2.8t_k}{T_{max}}}$	1.11	27
3d	$i_t = i_{max} - i_{max} \cdot e^{\frac{-6.0t_k}{T_{max}}}$	1.53	36

A NEW STRATEGY OF ANTIEROSION SOIL PROTECTION

Land reforms have been carried out in some countries of Eastern Europe and in the former republics of the USSR after its disintegration. In addition to state and social land property, private estates have appeared. A new category of landowners has been formed. Now the former state and collective farms are divided into small land allotments. So, the land is acquiring a new owner, who will be a more careful proprietor. At the same time, new problems have emerged in organising the struggle against soil erosion.

The strategy against soil erosion within large land units relied on a complex of methods applied zonally and based on organisational, agrotechnical, phytoreclamation, engineering and other technologies. Such complexes were worked out and partially realised in the former state and collective farms of Moldova (Soils of Moldova, 1984-1986).

Following division of the land units into small lots, antierosion systems are being disintegrated. Shelter-belts and runoff grounds are left without well-defined owners; road networks, field configurations and cultivation directions are changed. New co-operative farms and farmers need new technologies for realising erosion control.

In the conditions of heavy showers the superficial erosion intensifies, rain channels and gullies develop. Every year the area of eroded soils increases in some regions by 1 - 1.5%.

Moldova is rich in soil cover with about 75% of its area occupied by chernozems. These soils are the main wealth of the country. But Moldova has rugged relief (80% of cultivated lands are on slopes), and torrential summer precipitation. Agriculture occupies more than 85% of the land area. In the cultivated lands crops predominate, with gardens and vineyards covering a large percentage of the area, interrows of which are cultivated as fallow soils (Soils of Moldova, 1984-1986). Erosion of such soils has developed intensively. So, in some regions, eroded soils occupy more than 50% of the land. It is clear that soil erosion for Moldova is not only an agricultural, economical and ecological problem, but it is also a great national disaster. During two August days in 1994, very heavy showers caused huge damage and in such extreme events erosion cannot be prevented completely.

Every antierosion measure has its own possibilities to delay or absorb the precipitation runoff. The complex of measures can provide cumulative effects, but only to certain limits. Our investigations showed that in heavy shower conditions none of the zonal antierosion complexes can ward off soil erosion on the slopes with severely eroded soils, especially with row crops.

Taking into account the present situation in Moldova, ie. division of land allotments, absence of antierosion equipment, limited possibilities of realising zonal level control and the increasing erosion danger (Kouznetsov, 1993) in the period of establishing new land ownership, we suggest the following strategy:

1. To exclude from intensive agriculture use the massifs with a predominance of severely eroded soil. These territories are subjected to sodding with perennial grasses, and they must be transferred into the category of "sanitation" without private property on them.

2. To work out, design and realise a "green" framework, a kind of skeleton which can consist of old and new forest and bush shelters, united with existing forests, steppes and meadows into a general network. Such a framework must change the abnormal relationship between cultivated and unreclaimed fields (forest-, heath-, meadow- and bog-territories); it must also serve for reservation of world flora and fauna and for creation of a balanced ecology. The green framework together with the road network must determine the form and disposition of field plots on slopes (across them, as a rule), the direction of their cultivation and the opportunity of realising agrotechnical and phytoreclamation measures (Ursu, 1995).

3. Under certain conditions, to stop cultivation and return the land to its natural hydrology of runoff along hollows and small valleys.

4. To work out and inculcate a system of compulsory requirements and conditions of use and cultivation of slopes (cross-ploughing, cultivation and culture sowing; creation of buffer antierosion strips of perennial grasses, etc.).

5. To work out, examine and recommend new regional complexes of antierosion measures, connected with concrete natural conditions according to the small land uses.

6. To work out a system of equipment for antierosion measures (making furrows and pits for water absorption and dispersion of runoff, etc.).

Some measures are certain to need all-round state decisions (withdrawal of severely eroded soils, designing of green-framework, regulation of slope use); others need scientific and engineering technologies.

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WIND EROSION AS A FACTOR OF RADIONUCLIDE CONTAMINATION OF NORTH UKRAINIAN LANDSCAPES

North Ukraine is influenced by aridity and wind erosion, causing dust storms, is a large problem connected with contamination of environment. As a result of the Chernobyl accident in 1986 about 50 M Ki of radionuclides including 13% ^{137}Cs were injected into the atmosphere (Prister et al., 1991). Radioactive materials were deposited over an area of 36.8km^2 (Rauret and Firsakova, 1996) and ^{137}Cs was accumulated in upper 0-5cm layer of nonarable and 0-20cm of arable soils. Wind erosion destroys the upper layers of soil causing secondary contamination of the landscape by radioactive dust. Some climatic parameters of dust storms during the last 40 years are shown in Table 1.

Table 1. The number of days with dust storms (N), maximum wind velocity (V) and duration of dust storms (t_n) per year

Meteorological stations	Probability of exceeding (%)								
	1			20			50		
	N	V	t_n	N	V	t_n	N	V	t_n
Zhitomir	4.6	17.9	9.5	1.6	13.0	2.2	0.5	9.9	0.3
Kiev	8.3	14.5	9.7	3.6	9.2	3.7	1.9	6.5	1.5
Korosten	5.2	19.5	22.5	1.9	14.1	5.7	0.7	11.0	1.3
Lutsk	8.1	17.8	6.6	2.4	12.6	2.1	0.6	9.8	0.5
Rovno	6.0	23.3	8.9	1.8	12.6	1.8	0.6	8.3	0.1
Chernobyl	6.8	19.0	21.2	3.0	12.9	8.9	1.4	10.1	3.9

Note: V $m \cdot s^{-1}$

t_n hours

In North Ukraine the number of days with dust storms reaches 5-8 per year with a total duration of 7-21 hours per year. The volume of radioactive dust transferred by wind depends on the wind erosion modulus, duration of erosion, landscape structures and radionuclide concentration in the upper layer of the soil and in the dust. The quantity of soil losses researched by our method (Dolgilevich and Vasiljev, 1974; Dolgilevich et al., 1992) is calculated and shown in Table 2. Podzolic sandy loam soils under arable agriculture generate the most quantity of dust. Over the research area during the year dust storms arise in spring (35%), summer (30%) and in autumn (28%). During these periods a plant cover can protect the soil from blowing away. Under agricultural plants the reduction of soil losses due to wind erosion may reach 30-75%.

Table 2. Prognosis of soil losses caused by wind erosion (t ha^{-1} $year^{-1}$)

The main soil types of research area	Percentages of provided with wind velocity and duration of dust storms					
	1		20		50	
	Average	St. error	Average	St. error	Average	St. error
Reclaimable peat	13.6	4.4	0.6	0.2	0.07	0.04
Podzolic sand soil	210.4	54.6	20.9	7.2	3.0	1.6
Podzolic sandy loam soil	34.0	8.5	3.9	1.4	0.74	0.34
Podzolic loam soil	9.0	2.3	0.9	0.38	0.12	0.06

The transfer of radionuclides may be described using the formula:

$$Q = Et_n\, q_c\, K_L$$

where Q = the total transfer of radionuclides, $Bq \cdot kg^{-1}$

E = modulus of wind erosion corresponding to wind velocity, kg $ha^{-1} \cdot h^{-1}$

t_n = duration of dust storms, h

q_e = radionuclide activity concentrations in dust, Bq·kg^{-1}

K_L = corrective coefficient depending on density of plant cover (0.0-1.0)

In the contaminated area where ^{137}Cs deposition in the top soil layer is 185 kBq·m^2, every square kilometre of podzolic sandy soils may generate 3,400 t of dust per year. The ^{137}Cs activity concentration in the upper layer of soil is 1,300 Bq·kg^{-1}. The total transfer of this radionuclide from such fields may reach 44.2·10^8 Bq per year. Under agricultural plants the transfer of radionuclides decreases to 13.4·10^8 Bq. The very large amount of contaminated dust arising from the wind erosion process may cover several square kilometres of landscape.

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THE EFFECTS OF SOIL EROSION IN TUNISIA

Accelerated soil erosion in Tunisia occurs because of the natural conditions on the one hand and the social factors on the other. Particularly in the past, the natural vegetation was degraded and natural limitations on the ways of land cultivation were disregarded, resulting in long-term consequences in this transitional landscape at the contact of the Mediterranean and desert climates; these consequences are manifested as soil erosion, the formation of hard carbonate crust, and the expansion of the desert northwards.

Soil erosion occurs throughout Tunisia, particularly north of the 400 mm isohyet. According to Cote (1964, cit. Mensching, 1979), four zones of erosion intensity can be discerned.

Soil erosion is weak in the mountainous area of Mogod and Kroumir, because the soils are protected by vegetation. Landslides occur, but large barren areas are not so frequent compared to the situation in the southern part.

A second area of soil erosion stretches over the southern part of the forested mountains in northern Tunisia and extends to the southern edge of Dorsal. This is the main grain-producing area of the country where the natural vegetation is severely degraded. Erosion is intense here, due to periodic heavy rainfalls which wash away the shallow rendzina soils generated on limestone or marl and result in gullies and barren slopes. Especially endangered are the areas sown with cereals, the surfaces of which are ploughed and left "open" to erosion forces. Hence it follows that the maximum denudation of soil in Tunisia is climatically and ecologically conditioned, and further intensified by anthropogenic factors. Erosion is very aggressive due to the great volume of runoff (the water infiltration into the ground is very limited, particularly in rare rainfalls during summer droughts). The intensity of precipitation, ie. more than 10 mm/24 hours, gives rise to erosion gullies. The mineral brown to reddish-brown soils are intersected with linear "valleys" reaching down to the carbonate bedrock. The area of intense soil solution extends southwards from the 400 mm isohyet, and eastwards to the Sahel, which is exactly the area of intensive agriculture.

A third area of soil erosion occurs in the steppe where wind erosion occurs. Endangered are light brown sandy soils; therefore trees were planted on them.

In the semi-desert, wind erosion prevails. Since the horizons in the soils are not developed, there is no real soil erosion. Due to the minimal chemical weathering, clay particle contents are low. Above all, the soils lack humus. Southwards, the cumulative erosive powers of wind intensifies and is manifested in dunes and polished landforms.

The ecosystems in the semi-arid areas are unstable due to the variability of precipitation in both occurrence and quantity. Vegetation degradation has resulted in soil erosion, the extension of desert to once inhabited areas and, consequently, the transformation of soil on the edge of the desert into a real desert which is no longer suitable for cultivation and agriculture. Thus, the starting point of erosion was the removal or degradation of the vegetation cover.

Soil analyses have shown that sandy soils prevail with little capacity of water retention. Their reaction is alkaline, and they contain from medium to great percentage of $CaCO_3$ which, together with intense evaporation, give rise to the isolation of hard carbonate crust or salt, which all creates negative conditions for plant growing and land cultivation.

The problems of soil erosion in Tunisia were apparent in the time of the French protectorate, yet the country has been paying greater attention to these problems only since 1956 when it gained independence. Afforestation has been fostered, terraces have been made on the slopes, belts of trees have been planted to protect surfaces against wind, and steppe vegetation has been reinforced with new species of grass chosen to make a dense vegetation cover. About 30 million trees were planted on more than 100,000 hectares in the 1960s and the 1970s (Schliephate, 1984).

In northern Tunisia, afforestation has been carried out within the framework of an irrigation project. The planted species are pines (*Pinus halepensis*), eucalyptus and Californian pines (*Pinus radiata*). In the areas of steppe, great investment has been made into the recovery of the vegetation; wherever possible, pines have been planted, the existing vegetation (*Stipa tenacissima*) has been protected, and new cultures have been introduced. In the Sahara zone in the south, belts of trees run along the roads and encircle oases, thus preventing the expansion of the desert.

References

Mensching, H. (1979). Tunesien. Wissenschaftliche Buchgesellschaft, Darmstadt.

Schliephate, K. (1984). Tunesien. Institut für Auslandsbeziehungen, Stuttgart.

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Elections to Council 1996 - 2000

The procedures for electing the 1996-2000 Council were described in ESSC Newsletter 1/1996. The following candidates were nominated by the deadline in accordance with those procedures:

List of candidates for the Council 1996-2000 per country

In accordance with procedure No. 4 of the regulations, the present Council nominates the following six persons to serve on the the 1996-2000 Council: Bergman-Åkerman, Dazzi, Kertész, Misopolinos, Morgan and Richter.

Country	Members	Candidates
Austria	4	Nestroy
Belgium	37	Gabriels, Poesen
Denmark	11	Schjønning
France	46	Le Bissonnais
Germany	79	Auerswald, Bork, Richter*
Greece	31	Misopolinos*, Silleos
Hungary	14	Kertész*
Italy	27	Dazzi*, Torri
Netherlands	27	Kwaad, De Roo
Norway	6	Vagstad
Poland	22	Sklodowski
Portugal	38	Coelho, Madruga
Russia	66	Glazunov, Kuznetsov
Spain	103	Diaz, Ibañez, Pla Sentis, Rubio
Sweden	15	Bergman-Åkerman*
Switzerland	15	Schulin
Ukraine	11	
United Kingdom	39	Morgan*, Shakesby

* already nominated by the present Council

I) Regulations

Elections for the Council will be organised at the General Meeting to be held during the Second Congress at Freising-Weihenstephan in the following way:

1) The Council members for each country will be elected by the ESSC members of that country who are present at the General Meeting.

2) If only one candidate has been nominated as a country's representative on Council, that candidate will be the elected member.

3) If no members from a country are present at the Meeting, the General Meeting will elect a representative for that country from the list of nominated candidates.

4) In addition to the country representatives on Council, the former Council will nominate up to six members to serve on the new Council.

5) After the country elections have been held, the complete list of members for the new Council will be presented to the General Meeting for ratification. The General Meeting will decide to accept or reject the new Council in its entirety by a simple majority of votes.

6) The Council has the right to co-opt additional representatives on Council in the period between General Congresses.

Notes:

According to the rules for the elections of the 1996-2000 Council, those countries with 20 or more members of the Society may be represented by two Council members. Countries at present with 20 or more members are: Belgium, France, Germany, Greece, Italy, Netherlands, Poland, Portugal, Russia, Spain and the United Kingdom.

II) Duties of Council members

The duties of Council members are to:

1) contribute to the collective wisdom of Council in reaching decisions on matters relating to the Society;

2) promote the Society within their country, e.g. encouraging new members, publishing its activities;

3) report to the President on activities within their country which are of interest to the Society and its members; and

4) attend Council meetings.

Before standing for Council, candidates should ensure that they have sufficient time to undertake these activities and can command sufficient resources to attend the majority of the Council meetings. It is very important that the Society has an active Council.

III) Meetings

Meeting of 1992-1996 Council

The fifth meeting of the 1992-1996 Council will be held on Monday 2 September 1996 at 18.30 hours on the Weihenstephan Campus of the Technical University of Munich.

Agenda

1.) Opening remarks (Morgan)

2.) Present state of the Society (Richter)

3.) Report from Editor-in-Chief (Morgan/Richter)

4.) Report on Link between ESSC and CAB International (Morgan)

5.) Arrangements for Election of New Council (1996-2000)

6.) ESSC Awards (Morgan)

7.) Future Meetings

8.) Outstanding items to referred to New Council

9.) Any other items

Meeting of 1996-2000 Council

The first meeting of the 1996-2000 Council will take place during the Second Congress on Tuesday 3 September following the General Meeting.

Agenda

1.) Election of President 1996-2000

2.) Election of Executive Committee 1996-2000

3.) Election of Editorial Board 1996-2000

4.) Items referred to New Council by the Old Council

5.) Any other business

General Meeting of the European Society for Soil Conservation

The Second General Meeting of the European Society for Soil Conservation will take place during the Second Congress of the Society at Freising-Weihenstephan on Tuesday 3 September at 18.45 hours.

Agenda

1.) Opening remarks

2.) President's Report

3.) Secretary-Treasurer's Report

4.) Elections to Council 1996-2000

5.) Any other business

G. Richter
Secretary

R.P.C. Morgan
President

Announcements of Meetings

• **ESSC - Second International Congress: Development and Implementation of Soil Conservation Strategies for Sustainable Land Use**
1-7 September 1996, Weihenstephan/München, Germany
Contact: PD Dr. K. Auerswald, Institut f. Bodenkunde, Technische Universität München, Hohenbachernstraße, D-85354 Freising-Weihenstephan, Germany
☎ ++49 8161 713915 ; Fax ++49 8161 714466

• **Landnutzungsänderungen - Auswirkungen auf den Wasser- und Stoffhaushalt**
Vortrags- u. Diskussionsveranstaltung der Deutschen Bodenkundlichen Gesellschaft:
12-13 September 1996, Rauischholzhausen, Germany
Contact: Dr. K.-W. Becker, Institut f. Bodenwissenschaften, Von Siebold-Str. 4, D-37075 Göttingen
email: kbecker@gwdg.de

• **IV Congreso nacional de la ciencia del suelo: "Información de suelos para el siglo XXI"**
16-19 September 1996, Lleida, Spain
Contact: Carmen Herrero Isern, Sección de Evaluación de Recursos y Nuevas Tecnologías. DARP, c/ Rovira Roure, 177, E-25198 Lleida
☎ 973 220653 ; Fax 973 249403

• **13° JOURNEES DU "RESEAU EROSION"**
Thème: Erosion en montagne semi-aride et méditerranéenne
24-27 September 1996
Contact: A. Morel, 17 rue Maurice Gignoux, F-38031 Grenoble Cedex
☎ 7651 4109 ; Fax 7687 8243

• **Workshop on Physically Based Soil Erosion Models**
25-27 September 1996, Freiberg, Germany
Contact: Prof. Dr. J. Schmidt, Technical University Freiberg, Soil and Water Conservation Agricolastraße 22, D-09599 Freiberg, Germany
☎ ++49 3731 39-2681 ; Fax ++49 3731 39-2502

• **Application of Soil-Based Information For Understanding Surface Processes of the Earth System**
28-31 October 1996, Denver, CO, USA
Contact: Eric McDonald, EES-1 Geology/Geochemistry, MS D462, Los Alamos National Laboratory, Los Alamos, NM 87545
☎ 505 667-5055 ; Fax 505 665-3285 ; email: emcdonald@lanl.gov

• **International Conference On Mediterranean Desertification**
29 October-1 November 1996, Crete, Greece
Contact: Europpean Commission, DG XII - Science, Research and Development, Dr. P. Balabanis or Mr. D. Peter, 200, rue de la Loi, B-1049 Brussels
☎ +32 229 63 024 ; email: p.balabanis@mhsg.cec.be

• **Combined effect of wind and water on erosion processes" and**
"Use of windtunnels to assess wind erosion processes and control"
20-23 April 1997, Ghent, Belgium ; supported by Belgian Science Research Fund and ESSC
Contact: Prof. Dr. Donald Gabriels, University Ghent, Coupure links 653, 9000 Ghent, Belgium
☎ 32-9-2646036 ; 📠 32-9-2646247 ; email: dgabriel@allserv.rug.ac.be ; telex 12754 RUGENT B
Title and abstract of papers should be given to the secretariat until 30 September 1996.

• **International Symposium on Soil, Human and Environment Interactions**
4-11 May 1997, Nanjing PR China
Contact: Prof Z. H. Cao, email: zhaoqg@njnet.ihep.ac.cn, 📠 0086-25-3353590

• **International Symposium and Workshop: "Combating Desertification: Connecting Science with Community Action"**
12-16 May 1997, Tucson, Arizona, USA ; supported by ESSC
Contact: Mr. B. McClure, United States Department of the Interior, Bureau of Land Management, Arizona State Office, 3707 N. 7th Street, P.O. Box 16563, Phoenix, Arizona 85011-6563, U.S.A.
☎ 602-650-0513 ; 📠 602-650-0452 ; e-mail: bmcclure@attmail.com

• **Wind Erosion: An International Symposium / Workshop**
3-5 June 1997, Manhattan, KS, USA
Contact: USDA-ARS, NPA, Wind Erosion Research Unit, Throckmorton Hall, Kansas State University, Manhattan, KS 66506, USA ; WWW: http://www.weru.ksu.edu/
☎ USA 913-532-6495 ; 📠 USA 913-532-6528 ; email: sym@weru.ksu.edu

• **GERTEC - Workshop on Badland Processes and Significance in Changing Environments**
23-27 August 1997, Florence, Italy
Contact: Dr. Dino Torri, Prof. Giuliano Rodolfi
c/o CNR Soil Genesis, Classification and Cartography Res. Centre, p.le delle Cascine 15,
I-50144 Firenze, Italy
☎ ++39 55 360517 ; 📠 ++39 55 321148 ; e-mail: csgccs@csgccs.fi.cnr.it

• **16e Congrès Mondial de Science du Sol**
20-26 August 1998, Montpellier, France
Contact: 16ème Congrès Mondial de Science du Sol, Agropolis, Avenue Agropolis, 34394 Montpellier Cedex 5, France
☎ +33 6704 7538 ; 📠 +33 6704 7549 ; email: isss@agropolis.fr
Server WWW:http://www.cirad.fr/isss.html

New Books

1.) **Collection of Papers by Ukrainian Members of European Society for Soil Conservation 1995/2**

Institute for Soil Science and Agrochemistry Research: Chaikovsky str., 4, 310 Kharkiv, Ukraine
☎ +7 (0572) 43-16-44, 🖷 +7 (0572) 47-85-63

2.) **Soil Degradation and Desertification in Mediterranean Environments.**
J.L. Rubio and A. Calvo -Eds.- (1996). Logroño: Geoforma Ediciones. Apartado de Correos 1293. 26080 Logroño (Spain). ISBN: 84-87779-26-3. 290 pages.

This publication include the selected papers of two International Courses held on Valencia (Spain) under the auspices of Universidad Internacional Menéndez Pelayo, addresses the role of erosion, soil degradation, land use and desertification processes on Mediterranean environments, and some strategies to combat them.
The 15 selected papers have been grouped in 4 chapters, which provide information of the main degradation processes threatening the future of Mediterranean environments: 1.- Erosion processes (rainfall agressivity, soil erodibility, runoff, variability, etc.). 2.- Other factors and degradation processes (salinization, pollution, forest fires, land abandonment, ...). 3.- Degradation and modelling. 4.- Practices to reduce land degradation (conservative tillage, soil restoration, revegetation,...).

Mª José Molina, *Centro de Investigaciones sobre Desertificación-CIDE*

A new ESSC Special Publication:

New !

N. Misopolinos and I. Szabolcs (Edts.)

Soil Salinization and Alkalization in Europe

18 Selected papers of the Conference "Problems and Management of Soil Salinization and Alkalinization in Europe", Budapest and Karcag, Hungary, April 1994

Thessaloniki 1996
ISBN 960-7425-09-X
182 pages

DM 59,-

Please send your order to the Secretary's Office, Dr. G. Richter, University of Trier, D-54286 Trier / Germany.

AIMS OF THE SOCIETY

The ESSC is an interdisciplinary, non-political association, which is dedicated to investigating and realizing soil conservation in Europe.

The ESSC pursues its aims in the scientific, educational and applied sectors
- *by supporting investigations on soil degradation, soil erosion and soil conservation in Europe,*
- *by informing the public about major questions of soil conservation in Europe,*
- *by collaborating with institutions and persons involved in practical conservation work in Europe.*

The ESSC aims at co-ordinating the efforts of all parties involved in the above cited subjects: research institutions; teachers and students of geo-sciences, agriculture and ecology; farmers; agricultural planning and advisory boards; industries and governmental institutions.

ZWECK DER VEREINIGUNG

Die ESSC ist eine interdisziplinäre, nicht politische Vereinigung. Ihr Ziel ist die Erforschung und Durchführung des Schutzes der Böden in Europa.

Die ESSC verfolgt dieses Ziel auf wissenschaftlichem, erzieherischem und angewandtem Gebiet
- durch Unterstützung der Forschung auf den Gebieten der Boden-Degradierung, der Bodenerosion und des Bodenschutzes in Europa,
- durch Information der Öffentlichkeit über wichtige Fragen des Bodenschutzes in Europa,
- durch Zusammenarbeit mit Institutionen und Personen, die an der Praxis des Bodenschutzes in Europa beteiligt sind.

Die ESSC will alle Personen und Institutionen zusammenführen, die sich für die genannten Ziele einsetzen: Forschungsinstitutionen, Lehrer und Studenten der Geowissenschaften, der Landwirtschaftswissenschaften und der Ökologie, Bauern, landwirtschaftliche Planungs- und Beratungsstellen, Industrieunternehmen und Einrichtungen der öffentlichen Hand.

BUTS DE L'ASSOCIATION

L'ESSC est une association interdisciplinaire et non politique. Le but de l'association est la recherche et les réalisations concernant la conservation du sol en Europe.

L'ESSC poursuit cette finalité dans les domaines de la recherche scientifique, de l'éducation et de l'application:
- *en encourageant la recherche sur la dégradation, l'érosion et la conservation du sol en Europe,*
- *en informant le public des problèmes majeurs de la conservation du sol en Europe;*
- *par la collaboration avec des institutions et des personnes impliquées dans la pratique de la conservation du sol en Europe.*

L'ESSC souhaite favoriser la collaboration de toutes les personnes et institutions poursuivant les buts définis ci-dessus, en particulier: institutions de recherche, professeurs et étudiants en géosciences, des agriculteurs, des institutions de planification et des conseil agricole, de l'industrie, et des institutions gouvernementales.

OBJETIVOS DE LA SOCIEDAD

La ESSC es una asociación interdisciplinar, no-política, dedicada a la investigación y a la realización de acciones orientadas a la conservación del suelo en Europa.

La ESSC persigue sus objetivos en los sectores científicos, educacionales y aplicados, en el ámbito europeo:
- promocionando la investigación sobre degradación, erosión y conservación de suelos;
- informando al público sobre los principales aspectos de conservación de suelos;
- colaborando con instituciones y personas implicadas en la práctica de la conservación de suelos.

La ESSC aspira a coordinar los esfuerzos, en los temas arriba mencionados, de todas las partes implicadas: centros de investigación, profesores y estudiantes de geo-ciencias, agricultura, selvicultura y ecología, agricultores, servicios de extensión agraria, industrias e instituciones gubernamentales.

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