

75 years The International Society of Soil Science

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Abstract

This paper describes the history of the International Society of Soil Science (ISSS), including a regional analysis of memberships and an overview of the ISSS main activities. The ISSS was founded in 1924 by, mainly, European agro-pedologists who were interested in establishing standardised methods of soil analysis and soil classification. In total, 16 international congresses were organized by the ISSS in the past 75 years and eight of these congresses were held in Europe. Commissions, Subcommissions, Working Groups and Standing Committees have been established, which deal with virtually all aspects of soil research and management. Number of members increased from around 550 after WWII to over 7000 in 1998. Almost 60% of the members are from North America and Western Europe. Large differences were found in the number of soil scientists and ISSS/International Union of Soil Sciences (IUSS) members in relation to the total population and agricultural land area. One of the important contributions of the ISSS has been the Soil Map of the World, which was prepared in the 1960s and 1970s. The ISSS has also been active in dissemination and publication of scientific results through periodicals and cooperating journals. In 1998, the ISSS was restructured into the IUSS following upon its admission as a Union member of the International Council for Science (ICSU) in 1993. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Soil science is a relatively young science in which staggering developments have occurred. It has borrowed tools and techniques from the fundamental sciences (chemistry, biology, physics, mathematics) and the applied sciences (e.g., geostatistics, agriculture and forest sciences) and these have been applied to agricultural and environmental problems. Soil science has become a true science in its own right, with its own set of tools and techniques. A main development has been that many of the descriptive practices were replaced by systematic observations coupled with inductive reasoning and deductive experimentation. Most subdisciplines of soil science have matured, except for the subdiscipline history of soil science which has been a rather neglected subject (Yaalon, 1997).

The first book solely dedicated to the history of soil science was authored by I.A. Krupenikov and appeared in 1971. It was written in Russian, but an English translation ('History of Soil Science — From its Inception to the Present') appeared in 1993. In 1989, Boulaïne published a book in French on the history of pedology and soil science, and, in 1997, 'History of Soil Science — International Perspectives' appeared (Yaalon and Berkowicz, 1997). Historic developments of various fields of soil science have also been reviewed in some journal articles (e.g., Viets, 1977; Gardner, 1986; Tandarich et al., 1988; Simonson, 1999) and textbooks, e.g., the first chapter in 'Russell's Soil Conditions and Plant Growth' (Wild, 1988). Overall, historical information about developments in soil science is scattered and besides being neglected, there is an imbalance in subject treatments.

The International Society of Soil Science (ISSS) has played a major role in the development and promotion of soil science as a discipline. Since the society had paid little attention to historical developments, a Working Group was formed to deal with the History, Philosophy, and Sociology of Soil Science at the 12th Congress of the International Society of Soil Science, held in New Delhi in 1982 (Boulaïne, 1989). Subsequently, this working group became a very active Standing Committee.

At the commemoration of the 50th anniversary of the ISSS, a special issue of *Geoderma* (1974, Vol. 12) was published, entitled 'Fifty years of progress'. The nine papers presented in the issue recorded the development of the subject matters covered by the Commissions of the society. In the introduction to the issue, F.A. van Baren and V.A. Kovda remark: "...the volume will have a specific value not only as a historic review, but, also, as a source of information for the 10th Congress of Soil Science in Moscow." Also in 1974, a special issue of the ISSS Bulletin was published (ISSS, 1974) in which a brief history of the ISSS and its rules was presented, including an overview of activities between 1924 and the mid-1970s. The issue is a primary source for this paper, which reviews the main activities of the ISSS between 1924 and 1999, and its

successor the International Union of Soil Sciences (IUSS). The objectives of the paper are: (i) to sketch the formation of the ISSS; (ii) to present an overview of ISSS congresses and predecessor meetings; and (iii) to highlight achievements of the ISSS and to discuss the restructuring of the ISSS into the IUSS.

2. Formation of the ISSS

2.1. Meetings preceding the formation of the ISSS

The scientific study of soils started in the middle of the 19th century. However, opinions about the nature and development of soils as well as the best methods to study soils differed greatly. In essence, there were two groups: those that studied soils in the field (agro-geologists) and those who studied soils in the laboratory (agro-chemists). These groups operated in different continents. In the older long-settled areas of Western Europe, farmers had learned much about their soils by trial and error (Kellogg, 1974). Possibilities for extending the farm area were limited as the population was relatively dense (Visser, 1950). Hence, research interests focused on how to improve the soil conditions of existing fields. Not surprisingly, agricultural chemistry developed in Europe, thanks to major contributions from J.B. Boussingault, J. von Liebig, J.B. Lawes and J.H. Gilbert, among others.

In the USA and the old Russian Empire, there were large areas of soils, unlike those of Western Europe, that could be used for agricultural expansion. The questions in both countries were centred on finding out what soils they had, how to select those responsive to management and how to avoid waste of effort in farm development (Kellogg, 1974). Hence, there was a need for soil mapping and a better understanding of the concepts of the soils. The Russian V.V. Dokuchaiev and the Americans C.F. Marbut and later H. Jenny made great contributions to our understanding of how soils were formed (Simonson, 1989). That understanding formed an important base for the development of soil mapping, which was developed in both the USA and the old Russian Empire, though along somewhat different lines.

In summary, it can be said that in Western Europe, soil science found its origin in the laboratory, whereas in the USA and the Russian Empire soil science started in the field. The amalgamation of the two different soil research groups was essential for the establishment of soil science as a scientific discipline. That amalgamation would not have happened without the meetings and congresses that resulted in the establishment of the ISSS in 1924. There were three important international meetings at the beginning of this century, and these are briefly discussed below.

At the initiative of Hungarian soil scientists in the Royal Hungarian Geological Institute, the first International Conference of Agrogeology was organized in Budapest in 1909 (Szabolcs, 1997). The conference lasted for 10 days and was

attended by 86 scientists from 23 countries. The conference limited itself to general discussions of the origin of the soil and of the diversity of soil types (Anon., 1928) and included oral sessions and excursions. Suggestions were made to adopt a uniform system of soil classification and uniform methods of laboratory investigations. The desirability of an internationally accepted soil classification remains an elusive goal — for example, A. Ruellan mentions in the Preface of the Introduction to the World Reference Base: “The credibility of soil science suffers from the lack of a generally accepted system of soil classification” (Ruellan, 1998).

At the end of the conference in Budapest, it was decided to organise agro-geological conferences regularly. The next conference was held in Stockholm in 1910 and 170 soil scientists from around the world participated. The work of the conference was distributed among six sections dealing with the mechanical analysis of soils, soil colloids, preparation of soil extracts for chemical analysis, soil cartography, classification, and the nomenclature of soil types and soil conditions in various countries. Three international commissions were formed to investigate the various phases of the science and report at the next conference, due to take place in St. Petersburg in 1914 (Anon., 1928). This plan did not materialize because of World War I.

Eight years elapsed before attempts were made to bring together soil scientists from various countries again. In September 1921, D.J. Hissink and J. Kopecky sent a circular letter inviting soil scientists to assemble in Prague for a preliminary meeting, that was to arrange for the Third International Conference of Pedology. This preliminary meeting, held in April 1922, was attended by about 50 scientists. It was decided that the reunion in Prague would be designated the Third International Conference of Pedology. Another outcome of the 1922 meeting was the formation of five commissions, but more importantly, it was decided that the Fourth International Conference of Pedology would be held in Rome in 1924 at the invitation of the Italian delegation on behalf of the

Table 1
Meetings preceding the formation of the ISSS

Year	Meeting	Location	Number of participants	Important outcome
1909	First International Conference of Agrogeology	Budapest	86	Regularly organise agrogeological conferences
1910	Second International Conference of Agrogeology	Stockholm	170	Formation of three Commissions
1922	Third International Conference of Pedology	Prague	50	Formation of five Commissions
1924	Fourth International Conference of Pedology	Rome	463	Formation ISSS

Agronomic Society. Table 1 gives an overview of the meetings preceding the formation of the ISSS.

2.2. Rome 1924

In June 1923, a preliminary meeting was held in Zürich where the decision was taken to establish the ISSS at the meeting in Rome. The preparatory work for the Rome meeting was the task of the International Committee of Pedology. The Fourth International Conference on Pedology lasted from 12 to 19 May 1924 and was held under the patronage of the King of Italy and under the auspices of the International Institute of Agriculture. The number of adherents to the conference was 463, representing 39 countries, although the actual number of participants was less (Anon., 1928). In total, 280 communications were presented at the conference, divided among the various commissions. The conference in Rome recommended more uniform methods of soil analysis, a definite nomenclature for soil classification, the preparation of agro-geological maps of Europe at a scale of 1:0.5M and 1:2.5M, the organization of soil investigations in countries where these had not yet started, and an introduction to the study of soils into the curricula of intermediary and higher schools (Anon., 1928). It was also decided to encourage soil research worldwide as its primary goal.

Six commissions were established: I. Soil physics; II. Soil chemistry; III. Soil biology; IV. Nomenclature and classification of soils; V. Soil cartography; and VI. Plant physiology in relation to pedology. These commissions formed the structure of the ISSS, which was founded during the morning session on the last day, 19 May 1924. The draft rules were adopted unanimously. The United States was selected as the first meeting place of the ISSS and J.G. Lipman was elected as the first President of the society. Preliminary to the first Congress, a series of conferences were held by various commissions in Rothamsted, Groningen, Berlin, Dusseldorf, and Budapest.

The objectives, aims, activities and administrative and scientific structure of the society have to a certain extent remained the same since its establishment (ISSS, 1991). In order to foster all branches of soil science and its applications, the society organises congresses and conferences, forms commissions, sub-commissions, and working groups dealing with special problems of soil science, establishes standing committees, publishes relevant material, and cooperates with organisations in similar fields of work (ISSS, 1991).

The society functions through its officers, which are: the President, Vice-President, three past Presidents, Secretary-General, Treasurer and Deputy Secretary-General. The President and the Vice-President are residents of the country in which the next Congress is to be held. Table 2 gives an overview of ISSS Presidents and Secretaries-General of the past 75 years. The functions of the Secretary-General and Treasurer were combined until 1978 when D. Gabriels

Table 2

Presidents and Secretaries-General of the ISSS/IUSS between 1924–1999

President		Period	Secretary-General		Period
J.G. Lipman	USA	1924–1927	D.J. Hissink	Netherlands	1924–1950
K. Gedroiz	USSR	1927–1930	F.A. van Baren	Netherlands	1950–1974
J. Russell	UK	1930–1935	R. Dudal	Belgium	1974–1978
C.H. Edelman	Netherlands	1950	W.G. Sombroek	Netherlands	1978–1990
R. Tavernier	Belgium	1950–1954	W.E.H. Blum	Austria	1990–present
A. Oudin	France	1954–1956			
R. Bradfield	USA	1956–1960			
N.C. Cernescu	Romania	1960–1964			
E.G. Hallsworth	Australia	1964–1968			
V.A. Kovda	USSR	1968–1974			
C.F. Bentley	Canada	1974–1978			
J.S. Kanwar	India	1978–1982			
K.H. Hartge	Germany	1982–1986			
A. Tanaka	Japan	1986–1990			
A. Aguilar S.	Mexico	1990–1994			
A. Ruellan	France	1994–1998			
S. Theerawong	Thailand	1998–2002			

became Treasurer, succeeded in 1990 by P. Luescher. Deputy Secretaries-General have been elected since 1956 and they have been: P. Buringh (1956–1974), I. Szabolcs (1974–1990) and J.H.V. van Baren (1990–present). The task of the officers is the daily management of the society in accordance with the general instructions of the Council, the body consisting of the officers, the chairs of the commissions, one member representing each national society, and the honorary members.

3. ISSS congresses and members

3.1. ISSS congresses

Since 1924, the ISSS has organized 16 congresses of soil science each bringing together soil scientists from all over the globe. These have been very important for the society and its members. The purpose of a congress is also to handle the business of the society so as to ensure the advancement of soil science and its application (ISSS, 1991). Of the 16 congresses, eight have been held in Europe, four in the Americas, two in Asia, one in Australia and one in Africa (Table 3). The congresses are only open to society members. During the last decades such congresses have been held every 4 years.

Table 3 shows the number of papers presented per commission at each Congress. In the past 75 years, nearly 10,000 papers have been presented at

Table 3
Overview of the 16 ISSS congresses and number of papers presented per commission

Year	Location	Commission								Others	Total	
		I	II	III	IV	V	VI	VII	VIII			
1	1927	Washington DC	22	44	50	26	58	22	–	–	8	230
2	1930	Leningrad	25	31	58	41	66	29	–	–	16	266
3	1935	Oxford	22	22	18	35	39	18	–	–	0	154
4	1950	Amsterdam	28	71	27	46	99	12	–	–	0	283
5	1954	Leopoldville	18	30	23	20	65	20	–	–	0	176
6	1956	Paris	53	58	76	68	105	39	–	–	0	399
7	1960	Madison	37	46	38	81	67	35	18	–	0	322
8	1964	Bucharest	53	54	67	107	114	41	36	–	26	498
9	1968	Adelaide	35	23	61	47	62	62	14	–	6	310
10	1974	Moscow	45	73	28	55	129	43	22	–	0	395
11	1978	Alberta	56	64	41	65	94	52	27	–	12	411
12	1982	New Delhi	52	52	41	112	90	77	24	–	19	467
13	1986	Hamburg	113	202	90	217	187	54	55	–	95	1013
14	1990	Kyoto	107	139	120	256	199	103	63	–	69	1056
15	1994	Acapulco	186	273	160	317	288	206	62	–	78	1570
16	1998	Montpellier	194	239	149	312	275	119	69	168	544	2069

Commission I. Soil physics; II. Soil chemistry; III. Soil biology; IV. Soil fertility and plant nutrition; V. Soil genesis, classification and cartography; VI. Soil technology; VII. Soil mineralogy; VIII. Soils and the environment. Commission VII and VIII were established in Paris and Montpellier, respectively.

ISSS Congresses. There is a clear increase in the number of papers from 1986 onwards when poster-papers were introduced. The number of papers presented in Commission IV (soil fertility and plant nutrition) and Commission VI (soil technology) have increased more than in other Commissions. Up to 1950 papers were separated per Commission, but, thereafter, a paper can be assigned to two

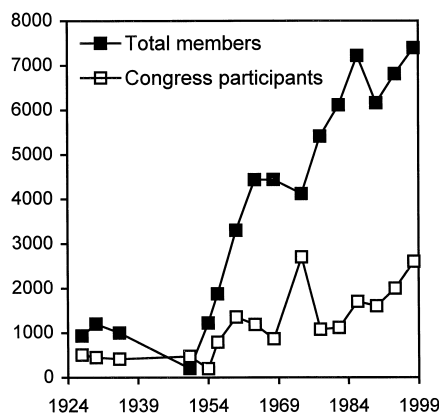


Fig. 1. Total members and Congress participants of the ISSS between 1924 and 1998.

or more Commissions and the numbers of papers assigned to the Commissions are, therefore, only an approximate.

Activities of the ISSS virtually ceased when WWII broke out at which time there were about 1000 members. In 1947, C.H. Edelman from the Netherlands took the initiative in calling a new meeting of the ISSS. In 1945, only 200 ISSS members remained, but at the 4th Congress in Amsterdam there were nearly 500 participants. From then on, the society grew rapidly and the total number of members increased from 1222 in 1954 to more than 7000 at the end of the 1990s (Fig. 1). The number of Congress participants since WWII has been between one-third and one-fifth of the total number of ISSS members.

3.2. ISSS members

The largest increase in ISSS members took place in Asia and Latin America (Table 4), in which the number of members tripled between 1974 and 1998. Few changes in membership were registered in Eastern Europe/CIS. The total number of members in Australia increased from 243 to 312 between 1974 and 1998, but the number in New Zealand decreased from 105 to 52 over the same period. More than half of the members are based in Western Europe and North America.

Table 5 presents the number of ISSS members for 31 countries in 1974 and 1998. The number of members was related to the inhabitants and agricultural land area for the 2 years. In 1974, New Zealand had the highest number of ISSS members per capita. Israel, Australia, Denmark and Belgium all had more than 10 ISSS members per million inhabitants. Israel had more than 16 ISSS members per 100,000 ha of agricultural land in 1974, followed by the Netherlands with about five members, and about three members per 100,000 ha of agricultural land in Denmark and Japan.

Table 4
Number of ISSS members for different continents in 1974 and 1998 (percentage of total members in parentheses)

	1974	1998	Difference 1974–1998 (%)
Western Europe	1316 (33)	2481 (35)	+ 89
Eastern Europe + USSR/CIS	351 (9)	379 (5)	+ 8
Middle East	104 (3)	233 (3)	+ 124
Africa	278 (7)	454 (6)	+ 63
Asia	280 (7)	881 (13)	+ 215
Australia + New Zealand	348 (9)	364 (5)	+ 6
Latin America + Caribbean	171 (4)	597 (8)	+ 249
North America	1110 (28)	1653 (23)	+ 49
Total	3958	7042	+ 78

In 1998, Switzerland and Israel had the highest number of ISSS members per million inhabitants, followed by the Netherlands, Australia and New Zealand. Russia, India and P.R. of China had relatively few members in 1998. Israel had, in 1998, the highest number of ISSS members per hectare of agricultural land and this had increased compared to 1974. Brazil, Australia and India had few ISSS members per hectare of agricultural land in 1998.

The total number of soil scientists in each of the countries is listed in the last columns of Table 5. In a considerable number of countries, only a fraction of the total number of soil scientists are ISSS members. New Zealand and Australia have the largest number of soil scientists per capita. Switzerland, Israel, Spain, Austria, Germany and the Netherlands have more than 25 soil scientists per million inhabitants. Japan, South Korea and Israel have the largest number of soil scientists per hectare agricultural land. In the Netherlands, Switzerland and Belgium, there are over 15 soil scientists per 100,000 ha agricultural land. The lowest number of soil scientists per hectare agricultural land is found in Canada, South Africa and Australia (< 0.5 soil scientist 1000 km^{-2}). The table also shows that there far fewer soil scientists in developing countries.

The society has conferred Honorary Memberships upon distinguished soil scientists who have retired from active posts. Honorary members may be elected at every Congress and proposals need to be approved by the ISSS Council. In total, 59 soil scientists were elected as Honorary Members (Table 6), of which nearly 60% were from Europe.

4. ISSS activities

An important benefit of the ISSS is that it provides an opportunity for soil scientists to meet, establish contact and exchange ideas. It is hard to measure and quantify how soil science would be without those activities. The ISSS has also been active in the dissemination of scientific knowledge about soils through periodicals and publications.

4.1. Periodicals

As an outcome of the activities of the 5th Commission of the International Committee on Pedology an important publication was presented for discussion at the 1924 Conference in Rome. It was entitled: “*État de l’Étude et de la Cartographie du Sol dans divers Pays de l’Europe, Amérique, Afrique et Asie*”, and contained information about the state of affairs of soil research and cartography in over 40 countries. The publication served as a basis for discussions and resolutions for work to be carried out before the 1st Congress in Washington in 1927 (Murgoci, 1924). Following the success of this publication

Table 5
 ISSS members per million inhabitants and agricultural land in 1974 and 1998, and total number of soil scientists in 1998

Country	1974			1998			1998		
	ISSS members	Members per million inhabitants	Members per 1000 km ² agricultural land	ISSS members	Members per millions inhabitants	Members per 1000 km ² agricultural land	Total number of soil scientists	Soil scientists per million inhabitants	Soil scientists per 1000 km ² agricultural land
Australia	243	16.8	0.1	312	16.8	0.1	1000	53.7	0.2
Austria	48	6.4	1.3	69	8.5	2.0	300	36.9	8.5
Belgium	97	10.0	–	85	2.8	6.2	250	24.6	18.2
Brazil	31	0.3	0.1	171	1.0	0.1	2900	17.1	1.2
Canada	226	9.9	0.3	285	9.3	0.4	320	10.4	0.4
China, P.R. of	0	0.0	0.0	107	0.1	0.1	10200	8.2	1.9
Denmark	80	16.0	2.7	59	11.1	2.2	72	13.5	2.7
Finland	29	6.0	1.1	56	10.9	2.4	84	16.3	3.5
France	51	1.0	0.2	161	2.7	0.54	900	15.3	3.0
Germany (E + W)	191	2.5	1.0	367	4.5	2.1	2500	30.5	14.4
Hungary	40	3.8	0.6	70	6.9	1.1	200	19.6	3.3
India	28	0.0	0.1	105	0.1	0.1	900	0.9	0.5

Israel	85	26.5	15.6	127	22.5	21.9	250	44.3	43.1
Italy	228	4.2	1.3	181	3.2	1.2	300	5.3	1.9
Japan	158	1.4	2.8	339	2.7	6.7	2800	22.2	55.1
Mexico	18	0.3	0.1	162	1.6	0.1	700	7.1	0.6
Netherlands	103	7.7	4.9	271	17.2	13.8	450	28.6	22.8
New Zealand	105	35.9	0.6	52	14.3	0.3	430	118.6	2.6
Norway	4	1.0	0.4	52	11.8	5.1	75	17.0	7.3
Poland	26	0.8	0.2	54	1.4	0.3	250	6.5	1.3
Portugal	85	9.2	2.2	77	7.8	2.0	125	12.6	3.2
Russia/USSR	70	0.3	0.1	101	0.7	0.1	1850	12.5	1.4
South Africa	125	5.0	0.1	117	2.7	0.1	270	6.3	0.3
South Korea	2	0.1	0.9	55	1.2	2.6	930	20.0	49.7
Spain	85	2.4	0.3	433	11.1	1.4	1450	37.1	4.7
Sweden	79	9.5	2.1	109	12.3	3.3	160	18.0	4.7
Switzerland	15	2.4	0.7	169	23.3	10.7	350	48.2	22.1
Thailand	8	0.2	0.1	65	1.1	0.3	500	8.3	2.4
Turkey	8	0.2	0.1	61	0.9	0.2	225	3.5	0.6
UK	186	3.3	1.0	322	5.5	1.9	1000	17.0	5.8
USA	884	4.1	0.2	1368	5.1	0.3	6050	22.4	1.4

Population data from the international database (IDB) of the US Census Bureau: www.census.gov; data on landuse from FAOStat: <http://apps.fao.org/default.htm>, for 1998 the data of 1994 were used; total number of soil scientists in 1998 as given by national soil science societies.

Table 6

Honorary member of the ISSS/IUSS

Year	Member	Year	Member
1924	L. Cayeux K. Glinka Jos. Kopecky E. Ramann Sir John Russell S. Winogradski		
	France USSR Czechoslovakia Germany UK USSR	1978	G. Barbier V. Ignatieff Y. Ishizuka L. Krolkowski L. Vettori
1927	P. Treitz		
	Hungary	1982	Ph. Duchaufour W. Flaig V. Kovda E. Mueckenhausen E.W. Russell
1935	E.A. Mitscherlich A. d'Sigmond J. Stoklasa G. Wiegner		
	Germany Hungary Czechoslovakia Switzerland	1986	H. Jenny D. Kirkham S.K. Mukherjee R. Tavernier
1950	A. Demolon D.J. Hissink W.P. Kelley		
	France Netherlands USA	1990	G. Aubert E.G. Hallsworth J.S. Kanwar P. Schachtschabel R.W. Simonson I. Szabolcs
1954	S. Mattson E. Truog		
	Sweden USA	1998	G.H. Bolt R. Dudal K.H. Hartge M. Kutilek J. Quirk W.G. Sombroek K. Wada D.H. Yaalon S.V. Zonn
1956	G. Bertrand E.C.J. Mohr		
	France Netherlands		
1960	F.A. Bear		
	USA		
1964	J.A. Prescott		
	Australia		
1968	F. Hardy W.L. Kubiena L.A. Richards A.A. Rode		
	UK Germany USA USSR		
1974	R. Bradfield G.V. Jacks Ch.E. Kellogg M.K. Kononova A. Oudin F. Scheffer		
	USA UK USA USSR France Germany		

the ISSS started in 1925 the periodical 'Proceedings of the International Society of Soil Science', which was first published by the International Institute of Agriculture in Rome. This successful publication contained scientific papers and a section with abstracts of new publications. It was edited by F. Schucht. As a supplement to these Proceedings, the journal 'Soil Research' was published from 1928 onwards. It was also edited by F. Schucht until 1942, when F. Giesecke took over until 1944, when its publication ceased. As a supplement to Soil Research, the periodical 'Official Communications of the ISSS' was published from 1939 to 1943. It was edited by the Secretary-General. In 1950, when contacts between ISSS members were reestablished after WWII, the ISSS Bulletin was introduced. The Bulletin appears twice per year and is edited by the

Secretary-General, with the Deputy Secretary-General as co-editor and responsible for the book review section.

In addition to the publishing of the Proceedings of the Congresses, organisers of meetings from Commissions, Subcommissions, Working Groups and Standing Committees are responsible for the publishing of the Proceedings of their meetings, either as books or as periodicals. It is estimated that publications from over 400 conferences have appeared since the establishment of the ISSS.

4.2. Cooperating journals

The ISSS successfully cooperates with a number of scientific journals which are published by commercial publishers. In the mid-1960s, some members perceived the idea that a new international journal of soil science could fulfil the growing need for more space to publish research papers, as well as reviews, on the diverse aspects of soil science (van Baren, 1967). At that time, the majority of soil research has been published in institutional or society periodicals and journals. There were a few journals published by commercial publishers. The concept of a new international journal was approved during the ISSS council meeting at the 8th Congress in Bucharest. However, the ISSS could not take direct responsibility for the establishment of a new journal. In 1965, the opportunity arose when Elsevier examined the feasibility of adding a soil science journal to the existing earth-science periodicals. It resulted in a new international journal of soil science, which was established in 1967: *Geoderma*, a name which was coined by the Secretary-General of the ISSS, F.A. van Baren, and the head of the Earth Science section of Elsevier, A.A. Manten. Shortly thereafter, *Soil Biology and Biochemistry* was initiated by J.A. Waid, and edited by E.W. Russell.

In the years that followed, a series of journals were approved as cooperating journals of the ISSS. Currently, there are seven: *Geoderma*, *Arid Soil Research and Rehabilitation*, *Biology and Fertility of Soils*, *Catena*, *Journal of Plant Nutrition and Soil Science*, *Pedobiologia* and *Soil Technology*, which was recently incorporated in *Soil and Tillage Research*. Although the role of the ISSS in these journals is minimal, many members serve on the editorial boards of the journals. In addition, ISSS/IUSS members may subscribe to these journals at reduced rates.

4.3. Soil map of the world

The ISSS provided the international framework for the development of a Soil Map of the World. At the 6th Congress in Paris in 1956, it was decided that Commission V should give special attention to the development of the classification and correlation of the soils of the main regions of the world. Soil maps covering Africa, Australia, Asia, Europe, South America and North America at

scales ranging from 1:5 M to 1:10 M were presented at the 7th Congress in 1960. It was decided that these maps should be published, because they reflected a vast amount of knowledge of the properties of soils and their distribution. However, it was soon apparent that nomenclature, survey methods, legends and systems of classification varied widely and that comparisons were difficult.

In response to the recommendation of the Congress and recognising the need for an integrated knowledge of the soils of the world, FAO and UNESCO agreed in 1961 to prepare jointly a soil map of the world in association with the ISSS. The six objectives of the Soil Map of The World were (Dudal and Batisse, 1978):

1. make a first appraisal of the world's soil resources;
2. supply a scientific base for the transfer of experience between areas with similar environments;
3. promote the establishment of a generally accepted soil classification and nomenclature;
4. establish a common framework for more detailed investigations in developing areas;
5. serve as a basic document for educational, research, and development activities; and
6. strengthen international contacts in the field of soil science.

The map was planned at a scale of 1:5M and was based on the compilation of available soil maps. The secretariat of the project was located at FAO headquarters in Rome. It was responsible for collecting and compiling technical information, soil correlation, and the preparation of maps and explanatory text in cooperation with soil scientists from different countries. On behalf of the FAO, the coordination of the project was assured by D.L. Bramão (1961–1968), L.D. Swindale (1968–1970) and R. Dudal (from 1970).

FAO and UNESCO had convened an advisory panel of eminent soil scientists from various parts of the world to study the scientific and methodological problems of a Soil Map of the World. At its first meeting, held in Rome in 1961, the advisory panel laid the basis for preparation of an international legend, the organization of field correlation, and the selection of the scale of the map and its topographic base. Several meetings followed and a first draft of definitions of soil units and of a correlation table were presented at the 8th Congress in Bucharest in 1964. In 1966, a general agreement was reached on the principles for constructing the international legend, on the preparation of the definitions of soil units, and on the adoption of a unified nomenclature. At the 9th Congress, held in Adelaide in 1968, the first draft of the Soil Map of the World was presented. It was recommended that the map should be published at the earliest possible date. The first sheets were printed in 1970, 9 years after the project had started. The complete Soil Map of the World was presented at the 10th Congress

in 1974, and publication of all 19 map sheets was achieved by 1981 (Dudal and Batisse, 1978). The completion of the Soil Map of the World has been one of the main contributions of the ISSS (Tanaka, 1990).

The objectives defined at the beginning of the project were met, and served the ISSS mission of stimulating international cooperation. The Soil Map of the World has since its completion found wide applications, for example: assessment of desertification, delineation of major agro-ecological zones, evaluation of global land degradation, calculation of population supporting capacity, creation of a World Reference Base for Soil Resources, and the creation of a digital global Soils and Terrain Database (SOTER). FAO in cooperation with ISRIC and the IUSS are endeavouring to keep the Soil Map of the World up-to-date by progressively incorporating new survey materials which become available from different parts of the world.

5. From ISSS to IUSS

As mentioned earlier, the ISSS continued practically unchanged in its structures and activities for almost three quarters of a century, during which time the world in general, and science in particular, changed radically. This long period is an indication of how sound the original arrangements were, but ultimately change is necessary in all organizations.

In the 1970s, the feeling began to grow that the Society needed reshaping and bringing up to date. The reasons were numerous, but the most obvious were: the complex and sometimes difficult relations of soil science with adjoining disciplines; the feeling that soil science had low esteem among other disciplines; a perennial state of financial near-crisis, that made the ISSS wholly dependent upon finding outside support; concern that soil science as a whole was fragmenting into subdisciplines; the very variable and sometimes slight activity and impact of Commissions; and the difficulty that the ISSS had in taking clear positions on new issues, such as the growth in the environmental sciences. The Committee on Statute and Structure (CSS), a standing committee of the ISSS, took the lead in discussions, which at first were largely on the scientific structure of the ISSS. A number of people contributed to these, but initially they made little firm progress.

At the same time, there were questions about why the ISSS was not a Scientific Union Member of the then International Council of Scientific Unions (now International Council for Science — ICSU), though it became a Scientific Associate in 1972. ICSU is the premier world representative body of the sciences, composed of the various Scientific Union Members, Interdisciplinary ICSU Bodies, Scientific Associates and National Scientific Members, Associates and Observers. The then Secretary-General, W.G. Sombroek, started to make contacts and conduct enquiries within ICSU. Following the appointment of

W.E.H. Blum as Secretary-General, the matter was again taken up energetically, and the ISSS Council applied formally to join. This was successful, and ISSS became a Scientific Union Member of ICSU in 1993, representing a major victory for the ISSS. The CSS simultaneously started to review the administrative and scientific structures, and made use of the ICSU model in the work described below.

5.1. The administrative structure

Earlier discussions had shown how difficult it was to reach agreement on a new scientific structure, and CSS decided to deal with the administrative structure first, though discussions on the scientific structure continued for the whole of the period from 1988. Most Scientific Unions have national scientific societies as members, whereas ISSS has always had individual members, and this seemed to be the source of many of the problems. It meant that less than 20% of the world's soil scientists were members of the ISSS, and much of the Society's money and time was spent on keeping in touch with the individual membership. The ISSS was, therefore, supported by a relatively small number of people, and the National Societies, that had seats on Council, were not formally members of the ISSS, and paid no subscriptions to it, which was a highly anomalous situation. This and other issues were debated by an expanded CSS over a period of several years, with meetings in Vienna, Oxford, Moscow, Montpellier and Louvain-la-Neuve, with the participation and guidance of the President and Secretary-General, and contributions from many people. These meetings produced a completely new set of draft Statutes to replace the original Rules. The name was changed to the IUSS, to stress the new status, and the recognition that there are many facets to soil science now. These draft IUSS Statutes defined the Full members as the National Soil Science Societies, their members being thereby members of IUSS also. If all National Societies join, there may be over 45,000 soil scientists in IUSS. The composition of Council and of the Officers remains much as before, but with this very different status for National Societies, which will strengthen their contact with IUSS. Many other changes followed from these, particularly in relation to the better financing of the Society, and in the production and dissemination of the Bulletin. Together these form the operational core of the new IUSS.

Following extensive consultation with the National Societies, publicity in the ISSS Bulletin, careful scrutiny by the Executive Committee and with the support of the Officers and Council, these new Statutes were put to a postal vote by ISSS in the spring of 1998. An astonishing 97% of those voting were in favour of the new Statutes, showing how strong was the desire for a new start. The Statutes are now published (IUSS, 1998). The new Statutes and name were declared to be in force by the President, A. Ruellan, on the last day of the 16th Congress in Montpellier in 1998.

5.2. *The scientific structure*

Discussions on the Scientific Structure continued throughout. The IUSS Statutes include a structure of Divisions, under each of which will be grouped several Commissions, because IUSS is so large, and modern science so complex, so that a tighter and stronger structure than that of ISSS is necessary. The concept is that there shall be a limited number of Divisions, to ensure that each of these is a large and active body, and to make it easier to maintain close links between the Officers and the Divisions. The Commissions will do most of the scientific organisational work, with the support of the Division. Time will, thus, be freed at Division level to determine matters of strategy. Working Groups and Standing Committees have been retained, with some changes in their functions.

In 1998, the ISSS Council decided that the 4 years between the 16th Congress in Montpellier and the 17th Congress in Bangkok was to be considered as a transitional period. Agreed changes are to be brought into effect as soon as possible during this period, and all issues not yet settled have to be decided soon after. As from 2002, the new Statutes and Structures should operate fully, with voting at that Congress being according to the new system.

5.3. *The way forward*

There is much still to do, and we need the support of all the membership to reach a satisfactory conclusion. The vote has been taken, the major administrative reorganisation and name change have taken place, but many issues still remain, and much experience has to be gained with the new Statutes. The main task remaining is to reach agreement over the Scientific Structure, which will need a willingness to compromise and to take account of the needs of the whole society. The selected structure is expected to be recommended to the midterm Council meeting and if agreed there, the decision will be ratified by the Council at the Congress in 2002. The further development of the new financial system, and arrangements for elections under the new scheme are yet to be settled. The by-laws that govern the life and activity of the IUSS are less formal rules that amplify and clarify the Statutes, and which can be changed rather more easily. A good start has been made by CSS on the task of drawing these up, but they contain several contentious issues, and time and patience may be needed to settle them.

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