History and Challenges of Soil Education in Japanese Primary School based on the Government's Guidelines

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1. Analysis of the Guidelines for primary school education

In Japan, education is compulsory for age 6-12 (primary) | understand how the soil is taught, soil related items and 13-15 (secondary). School education is carried out 👘 are picked from the Guideline for primary school (1st based on the Guidelines (called "Courses of Study") by to 6th grade) in science area and listed with number of citation of soil. Items referring to the nature of soil, the Ministry of Education, Culture, Sports, Science and relating to plant growth and ones not directly related Technology (MEXT). Since the first draft in 1947, the Guideline has been revised almost every 10 years. To to the nature of soil are separately colored in the table.

Item in the guideline, related to soil			
		19	
			Number of citation on soil in science area*
Feeling of soil by hand (play with soil)		3'	
Observation of water seepage into soil (of different type)		2r	
Seepage of water differs between clayey and sandy soil		3'	
Clay and sand differ in their particle size		3'	
Clay and sand differ in their stickiness		3'	
Soils differ in the content of clay and sand			
Downward movement of the soil particle in water differs according their size	2 nd		
Color of soil		3'	
Soils are transformed from rocks		3'	
Observation of dead leaves becoming soil	2 nd		
Collect soil nearby and make soil samples	3 rd		
Make a research on mountain rock, sand and soil, and how soil forms	6 th	It	
Understand difference of soil, sand and rocks, differentiate soils into clay and sand	0	V	
Soil temperature in relation to heat of the sun			
River water remove and carry rocks and soils			
Soils that plant grow contains air and water			
Temperature of the soil			

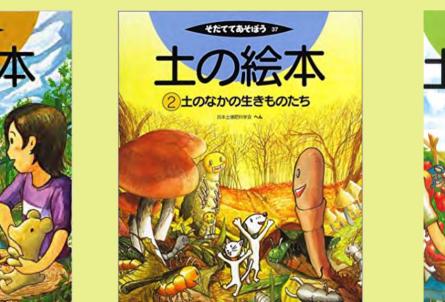
*from Hirai et al. (2011)

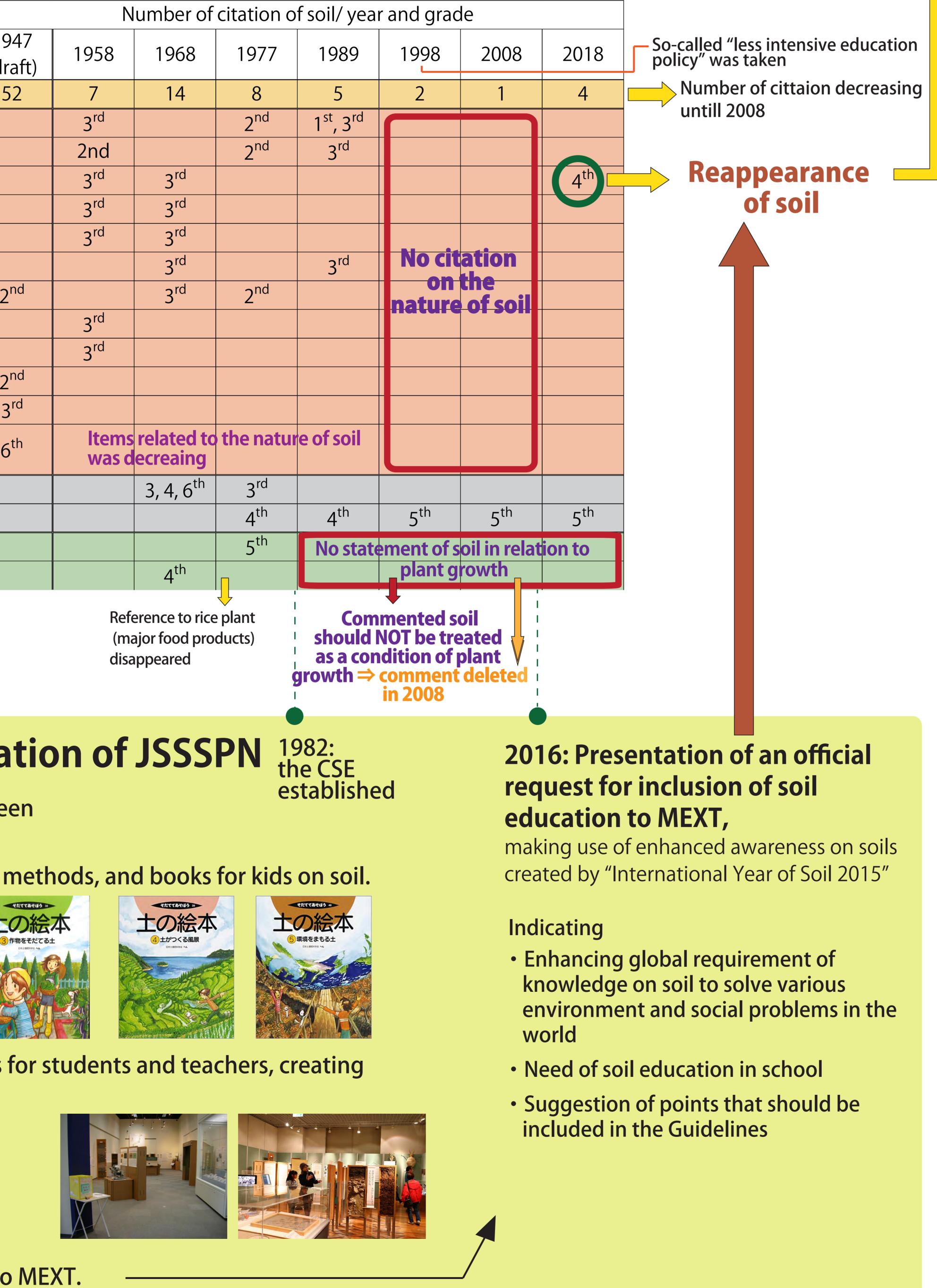
2. Activity of the Committee for Soil Education of JSSSPN 1982: the CSE

Recognizing the importance of soil education in school, JSSSPN has been putting efforts on the dissemination of soil education including;

Publishing manuals on soil observation and proposal of teaching methods, and books for kids on soil.



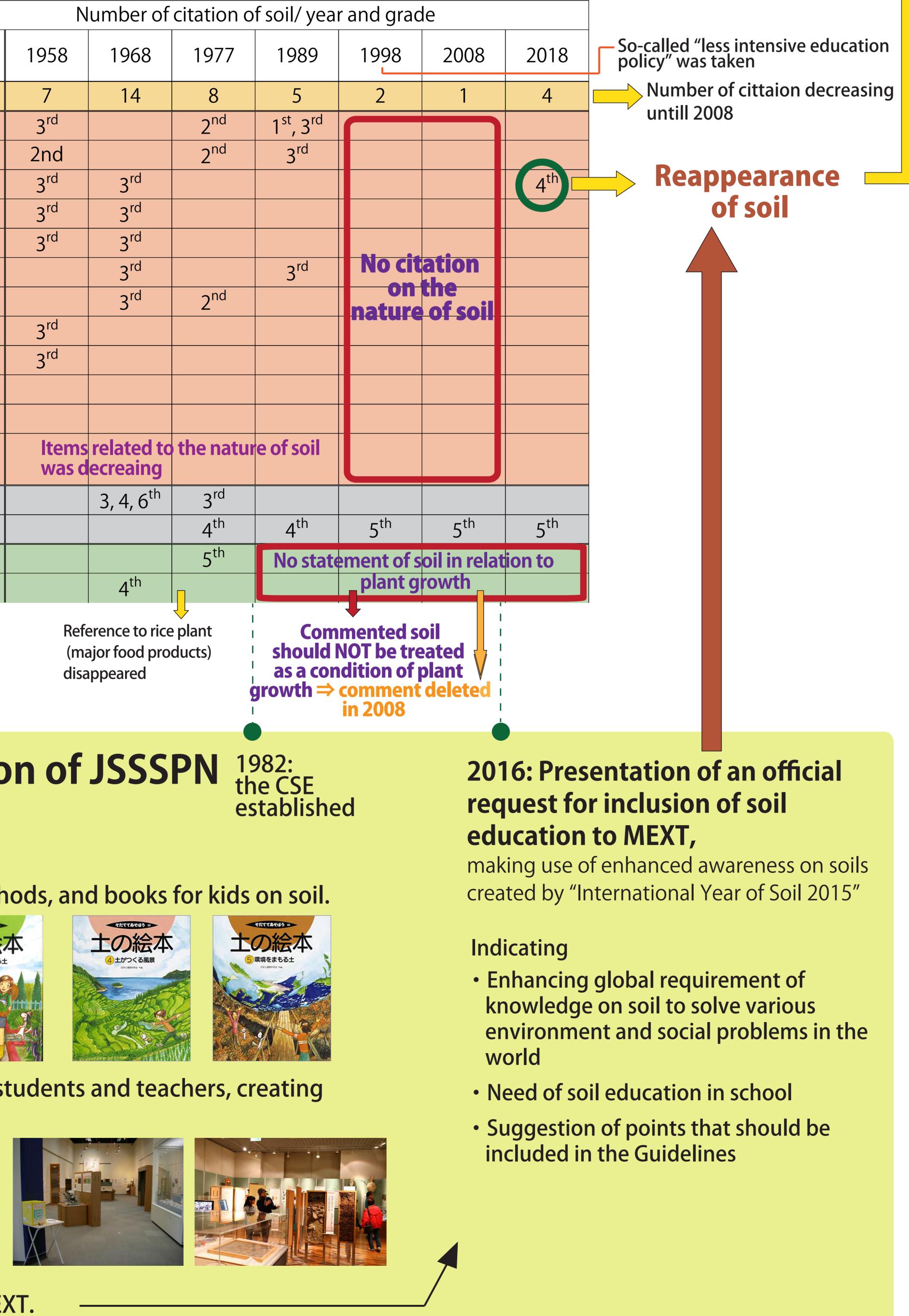




Organizing events and programs including scientific experiments for students and teachers, creating continuous awareness.







Presentation of an official request for inclusion of soil education to MEXT.

- (1) Saitama Museum of Rivers, Saitama, Japan (keiko_mori@river-museum.jp)
- (3) International Union of Soil Sciences, Vienna, Austria

(2) Committee for Soil Education of JapaneseSociety of Soil Science and Plant Nutrition, Tokyo, Japan (Faculty of Agriculture, Utsunomiya University)

3. The latest Guidelines for primary school (in act from April 2018) 4th grade and teaching guidance proposed (extraction)

B: Life and Earth

(3) Fate of rain water and the state of the gound

Concerning fate of rain water and the state of ground, search how the water runs and seeps into the ground in relation to the tilt of ground and size of soil grain, understand and obtain the skill of observation and experiment concerning the following;

A: Water runs from higher to lower place.

B: Seepage of water differs in relation to the size of soil grains.

Structure and some contents of the proposed teaching guidance

How to proceed the class on this sub-chapter

[Task to be solved] Is speed and output of water different in relation to soil grain

[Observation and Experiment]

[Materials and Method]

- Materials (in order of smaller size*)
- Soil (from flower bed, loosen some large aggregation)
- Sand (from sand ground of court yard) Stones (from around the school buildings)

Method

- Cut a plastic bottle to half, ….
- Observe the following points.
- 1. The speed of water coming out.
- Amount of water in the cup.

Movie of this experiment is on web-site of the Committee of Soil Education of JSSSPN.



<u></u> 8肥料学会土壤教育委	員会	親察した日: 年 月 日 親察した場所: 天気:	
ゔゔ゚゙゙゙゙ゔゔ 土や砂	^{みず さま} こ水を通し		-
あいたカップに土々 のくらい通り抜け	や砂を入れて、それに るかな?	水を注いでみよう。	
れたもの	入れたもの	入れたもの	
ざれくらい落ちて	きたかな?そのよ	うすを記録しよう!	

(http://jssspn.jp/edu/activity/publication/movie/movie-05hosui.html)

*To examine the difference of the particle (grain) size, put each material into a plastic bottle with water and shake. After leaving the bottle for a while, observe how soil particles have settled. Pen light will help the observation.

Movie of this experiment is on web-site of the Committee of Soil Education of JSSSPN.



[Results and examples of discussion]

[Example of points of consideration]

- Water seeps well with sand and stones. This may be because the space between particles (grains) is large and water easily goes through.
- Water seeps slower with soil and water remained longer. This may be because the space between particles is narrow and water only slowly goes through and has ability to hold water like sponge.

[Discussion for drawing conclusions]

4. How soils should be taught in primary school?

In the guidelines, the content is mostly on physical properties of soil only. The feeling of soil might be good start for lower grade students, but more biological and chemical aspects of soil, and relation to plants and ecosystem are also neccessary for upper grade students. It is important to make students recognize that soils are the base of life on land.

For example…

1st grade: Playing with soil and discover the feeling of soil. 2nd grade: Learn about soil animals. They are abundant in surface soil. 3rd to 5th grade: Plants need sun light, water and nutrient for growth. Food web of plant and animals, and dead animals and plant goes into soil and new life starts from soils. Physical nature of soil. 6th grade and up: Importance of soil as a "filter" for water and air in the

From aim and scope of the guidelines, it is apparent that this sub-chapter is conscious with natural hazard. JSSSPN welcomed the reappearance of "soil", and released a proposal of teaching guidance for better understanding and use of this sub-chapter by teachers and text publishers, with intention to suggest the importance of soil aggregates in comparison to "soil grain", single partilce, as one of the applied studies.

(http://jssspn.jp/edu/ activity/publication/movie movie-04tsubu.html)

[Suggested Conclusions]

The small grains of soil that forms surface ground hold rainwater and alleviate the speed of rainwater goes through. Viewing from the prevention of natural hazard, the existance of small soil grains increase the ability to hold rainwater and prevent flooding.

Applied studies

As applied studies, it can be discussed that under forest vegetation, soil aggregates forming with soil grains keep good drainage and water holding capacity leading to rich vegetation, resulting in alleviation of natural hazard. Make students notice that conservation of forest and soils is important in the prevention of erosion due to heavy rain.

[Examples of the applied study]

- 1. Soil animals are abundant under forest or steppe vegetation forming aggregates, which is formed with soil small grains. Good aggregates has high water holding capacity. Let's research about soil aggregates.
- Think about ground with vegetation such as forest, no vegetation with bare soil, no vegetation nor soil such as concrete roads in relation with rainwater seepage.
- 3. Cultivate plants with soils used in the experiment (soils of flower bed and sand), and compare the growth.
- environment and function in ecosystem.

How about in your country?

Isn' it time to discuss the world standard for teaching soil in the priamary education?

