



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



Soil Environmental Standards/Screening Values in China

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Contents

- ◆ The **GB15618-1995** Standards
- ◆ Analysis on **Urgent needs** for Revision
- ◆ A Proposed **Framework** of SESs
- ◆ **Methodologies** for Derivation
- ◆ Concluding remarks

Land/Soil related Laws & Regulations

- ◆ **Land** Administration law (1986, 1998, 2004)
 - ◆ **Agricultural** law (1993, 2002)
 - ◆ **Forest** Law (1984, 1998)
 - ◆ **Grassland** Law (1985, 2002)
 - ◆ Regulation on Protection of **Basic Agricultural Fields** (1998)
 - ◆ **Land Reclamation** Regulations (2011)
 - ◆ Quality and Safety of **Agricultural Products** Law (2006)
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Environmental Legal System in China

- ◆ Environmental Protection Law (1989, in revision)
- ◆ **Air** Pollution Prevention and Control Law (1987, 1995, 2000)
- ◆ **Water** Pollution Prevention and Control Law (1984, 1996, 2008)
- ◆ **Solid Waste** Pollution Prevention and Control Law (1995, 2004)
- ◆ **Radioactivity** Pollution Prevention and Control Law (2003)
- ◆ Environmental Impact Assessment Law (2002)

- ◆ Recent decision to have in the near future:
 - **Soil Environmental Protection Law (in preparation)**
 - **Start from late 2012**

Environmental Quality Standards in China

- ◆ **Ambient Air** Quality Standards (GB 3095-1996, GB 3095-2012)
- ◆ **Indoor Air** Quality Standards (GB/T 18883-2002)
- ◆ **Surface Water** Environmental Quality Standards (GB 3838-2002)
- ◆ **Groundwater** Quality Standards (GB/T 14848-1993)
- ◆ **Sea Water** Quality Standards (GB 3097-1997)
- ◆ Water Quality Standard for **fishery** (GB 11607-1989)
- ◆ Standards for **Irrigation Water** Quality (GB 5084-1992)
- ◆ **Environmental Quality Standards for Soils**
(GB 15618-1995)

The GB15618-1995 Standards

◆ The GB 15618-1995 standards

- Derived/proposed by **NIES**
- **1987**: initiation of a research project
- **1989**: development of the standard system;
- **1 July 1995** : issued by **MEP** (previous SEPA)
- **1 March 1996**: put into effect till now

The GB15618-1995 Standards

◆ Aims

- To prevent soil pollution
- To protect soil functions, eco-environment, agricultural & forestry production and human health

◆ Scope

- farm land, vegetable and tea producing field, orchard
- soil, pasture and natural reserved area

◆ Classification of standard values

- 3 classes

◆ Factors considered

- soil pH, CEC

The GB15618-1995 Standards

◆ Class-1 standards:

- Soil background level
- Natural conserved area, drinking water source area etc.
- Nationally wide background values based
- Sampling locations: more than 4000 samples
- Described by Log-Normal distribution

The GB15618-1995 Standards

◆ Class-2 standards:

- Ecological and environmental effects based
- Farm land, fields of vegetable and tea production, orchard soil
- Healthy **plant growth** and **safe food** quality
- No potential effects on water bodies

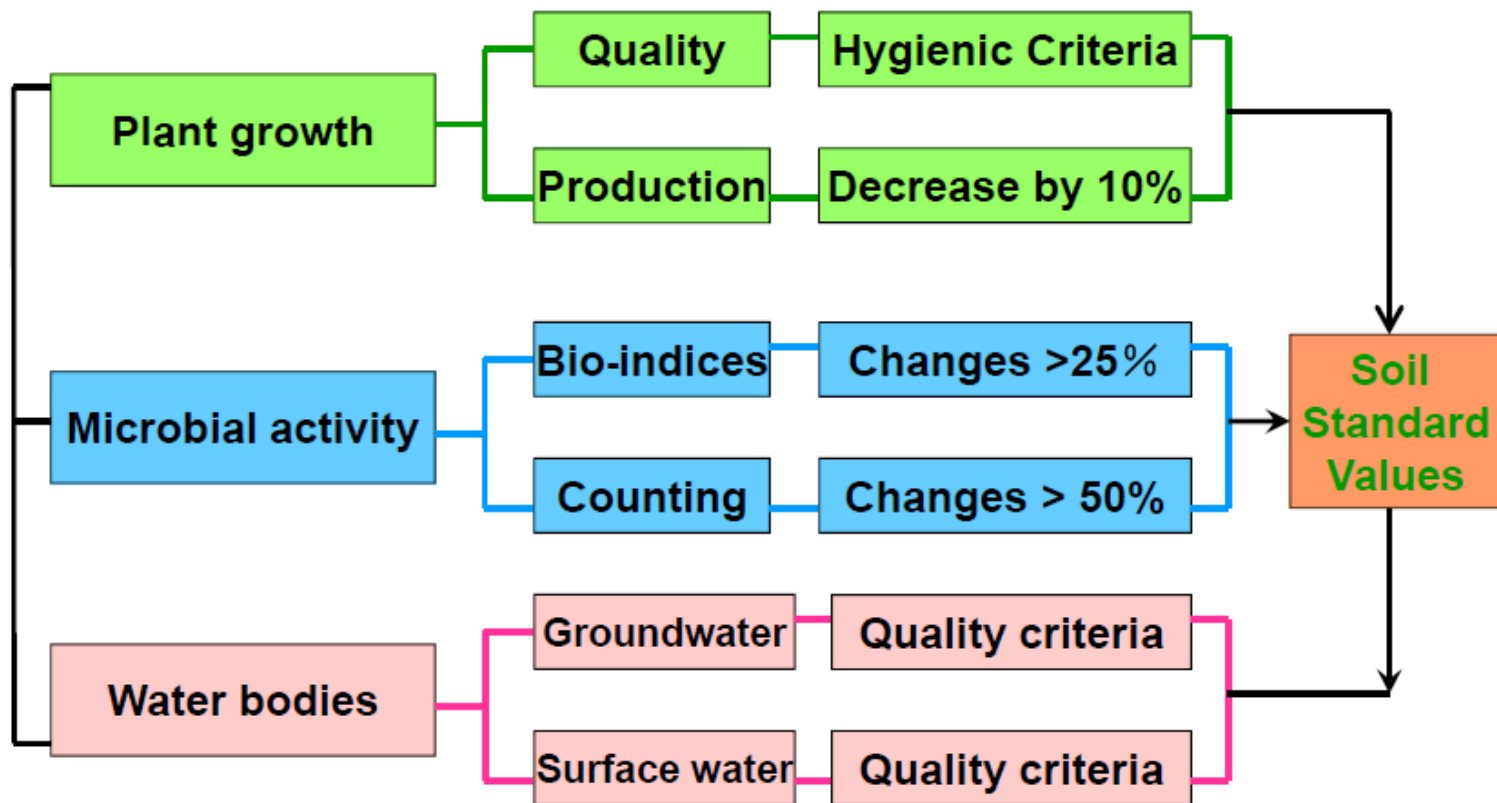
The GB15618-1995 Standards

◆ **Class-3 standards:**

- Soil of higher adsorption capacity/background levels;
- Healthy growth of trees/plants, no hazard to environment
- Derivation method similar as Class-2 standards;
 - Use experimental data based on soil of higher adsorption capacity and artificially contaminated soils.

The GB15618-1995 Standards

◆ Elements considered for derivation of GB15618



The GB15618-1995 Standards

Contaminants	Class-1 Background	Class-2			Class-3 >6.5
		<6.5	6.5 - 7.5	>7.5	
Cd	0.20	0.30	0.30	0.60	1.0
Hg	0.15	0.30	0.50	1.0	1.5
Ni	40	40	50	60	200
As Paddy	15	30	25	20	30
Dry land	15	40	30	25	40
Cu ^a Agri.	35	50	100	100	400
Frui.	-	150	200	200	400
Pb	35	250	300	350	500
Cr ^b Paddy	90	250	300	350	400
Dry land	90	150	200	250	300
Zn	100	200	250	300	500
HCH ^c	0.05		0.50		1.0
DDT ^c	0.05		0.50		1.0

a: 'Agri.' represents agricultural soils, and 'Frui.' represents fruit farm soils.

b: In case soil CEC < 5cmol(+) kg⁻¹, the standard values will be half values of the listed.

c: HCH (hexachlorocyclohexane), values are the sum of 4 isomers;

d: DDT (Dichloro-diphenyl-trichloroethane), values represent the sum of DDT, DDD and DDE.

Evaluation of the GB15618-1995

- ◆ been **an useful tool** for soil environmental management in China for long time;
- ◆ more suitable for management of **agricultural soil** quality
- ◆ supporting scientific **data is limited** for the derivation;
- ◆ lack of consideration on **human** exposure risk;
- ◆ **less contaminants** of concern (no VOCs addressed);
- ◆ **urgent needs** for revised SEQs i.e.
 - more contaminants
 - various land uses, agricultural, residential, industrial...
 - ...

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Soil Environ. Policy/Regulations in China

- ◆ 6 June, 2008: 《Guidance on Enhancing Affairs on Soil Pollution Control, Prevention and Treatment》 (MEP-No.2008.48) ;
- ◆ 15 December, 2009: 《Ministerial Ordinance on Management of Contaminated Site and Soil Environment》 (Draft for approval) ;
- ◆ 27 November, 2012 : 《Circular on Enabling Environmental Safety during Redevelopment of Industrial Sites》 (MEP-No.2012.40)
- ◆ 23 January, 2013 : 《Circular on Recent Arrangement on Soil Environmental Protection and Integrated Remediation/Treatment》 (China State Council No.2013.07)
- ◆ 19 April, 2013 : 《Circular on Implementation of the China Council Circular CSC-No.2013.07》 (MEP-No.2013.46)



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The Central People's Government of the People's Republic of China



- ◆ 23 January, 2013 : the China State Council Circular **(No.2013.07)** clarifies main tasks as following :
 - Strict control on newly emerging soil contamination
 - Defining priority protection areas, i.e. cultivated land
 - Enhancing risk control of contaminated soil environment
 - Carrying out soil pollution control and remediation
 - Improving capability of soil environmental monitoring and supervision
 - Accelerating development of soil environmental protection engineering program

Urgent Needs for Protecting Soils



- **Agricultural/natural soil**

- **large area** as an agricultural country
- important for safe quality of **agricultural produces**
- Soil in certain area might be contaminated due to **various reasons**
- **Priority** is given to “**Protection of soil quality**”
- **Risk control and management** in case of slightly contaminated agricultural soils

Urgent Needs for Risk Management

- **industrial sites/soils**

- also known as “**brown field**”

- including Chemical/pesticides production, oil/petroleum industry, mining sites, gas works etc.

- Soil has been **heavily contaminated** by various types of chemicals

- **Lack** of information on site history

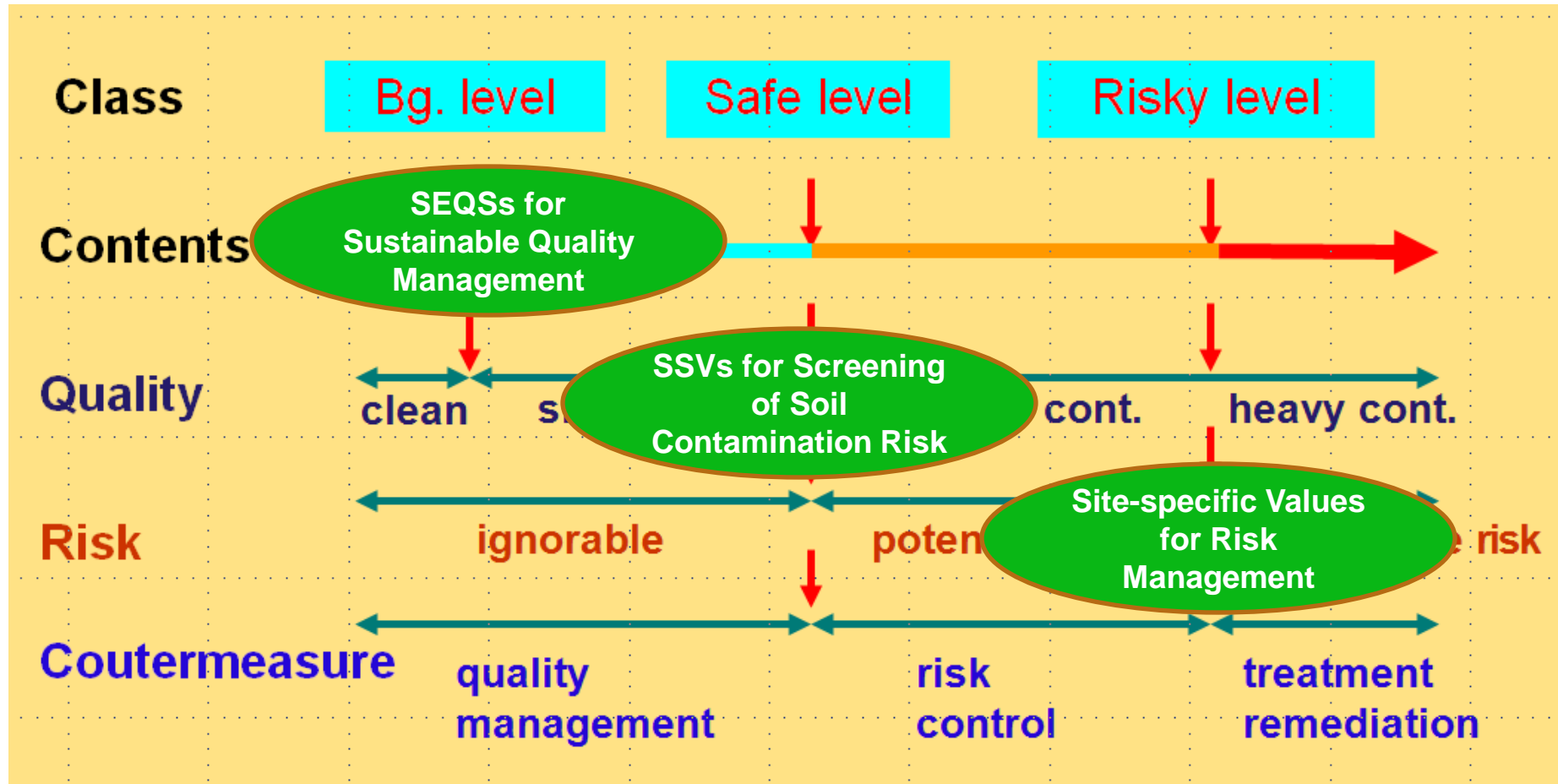
- High economic value for **redevelopment** (residential use etc.)

- Risk management process: **site investigation, risk assessment, and remediation** when necessary

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Proposed Framework of SEQs/SSVs



Proposed Framework of SEs

◆ Purpose

—general protection of uncontaminated (natural/agricultural) soils

◆ Derivation

—extrapolate with **statistical method** with support of soil environmental backgrounds data

— take into account local background and can be **area specific** SEQs



◆ Application

— For sustainable soil quality management

—**lower than SEQs**: uncontaminated level and no actions is needed

—**higher than SEQs**: source control measure shall be taken

SSVs for Screening Potential Risk/COCs

◆ Purpose

— Screening of **potential risks and COCs** associated with contaminated soils

◆ Derivation

— derive risk assessment methods based on generic exposure scenarios
— SSVs for **various land uses**, i.e. residential, industrial land

◆ Application

— **ONLY** used for “**historical contaminated sites**”, never as up limits of contaminants
— **lower than SSVs**, no significant risk,
— **higher than SSVs**, unacceptable risks potentially, further action is needed, i.e. investigation.



Site-specific SRLs for Risk Management

◆ Purpose

— for sustainable remediation/redevelopment of historical contaminated sites/soils

◆ Derivation

— scientific methods (HRA, ERA), while taking into account other factors, i.e. technological and economic feasibilities

— for a specific site/soil and a defined land use

◆ Application

— **lower than SRLs**, acceptable risk level is achieved after remediation

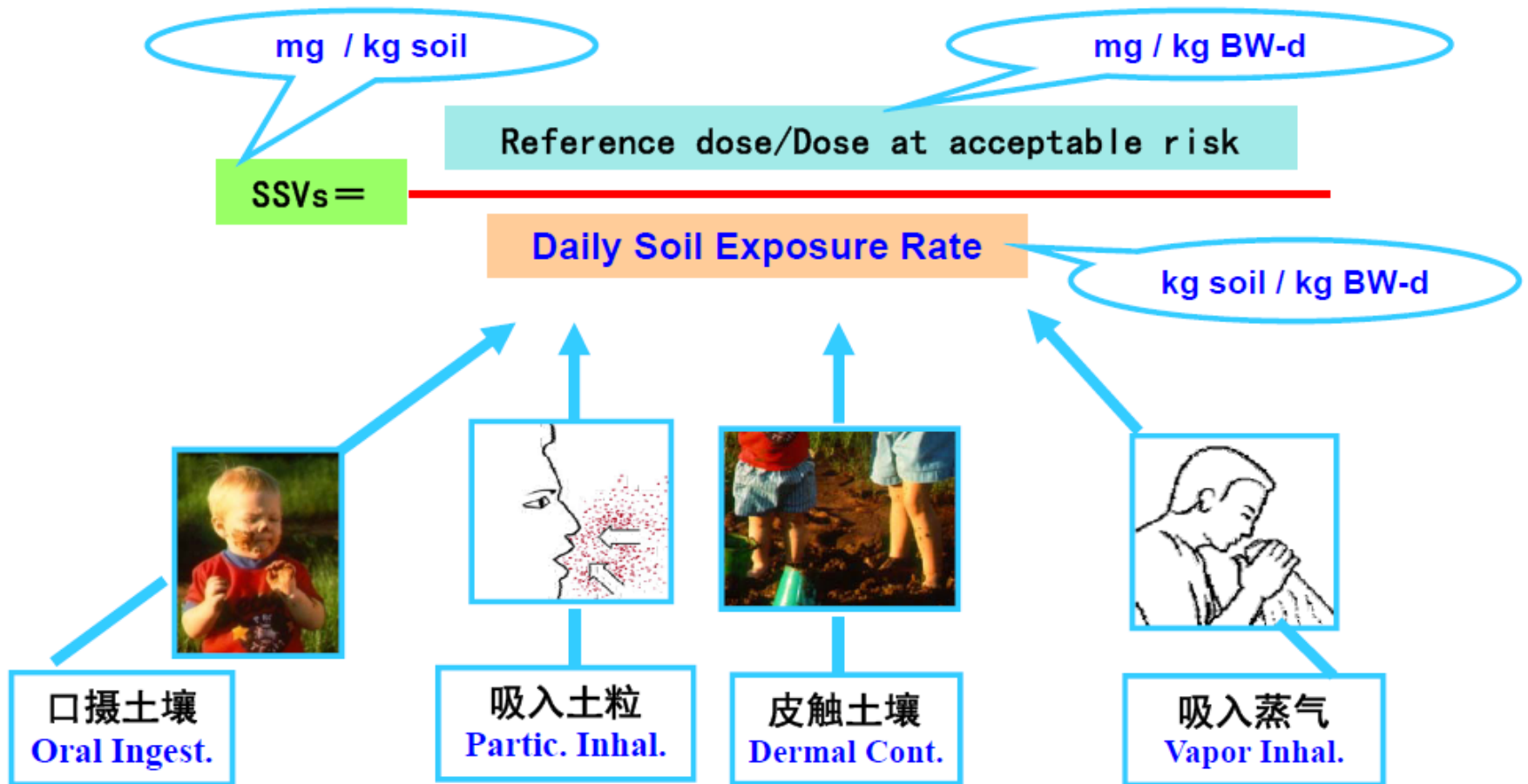
— **higher than SRLs**, further remediation actions in need



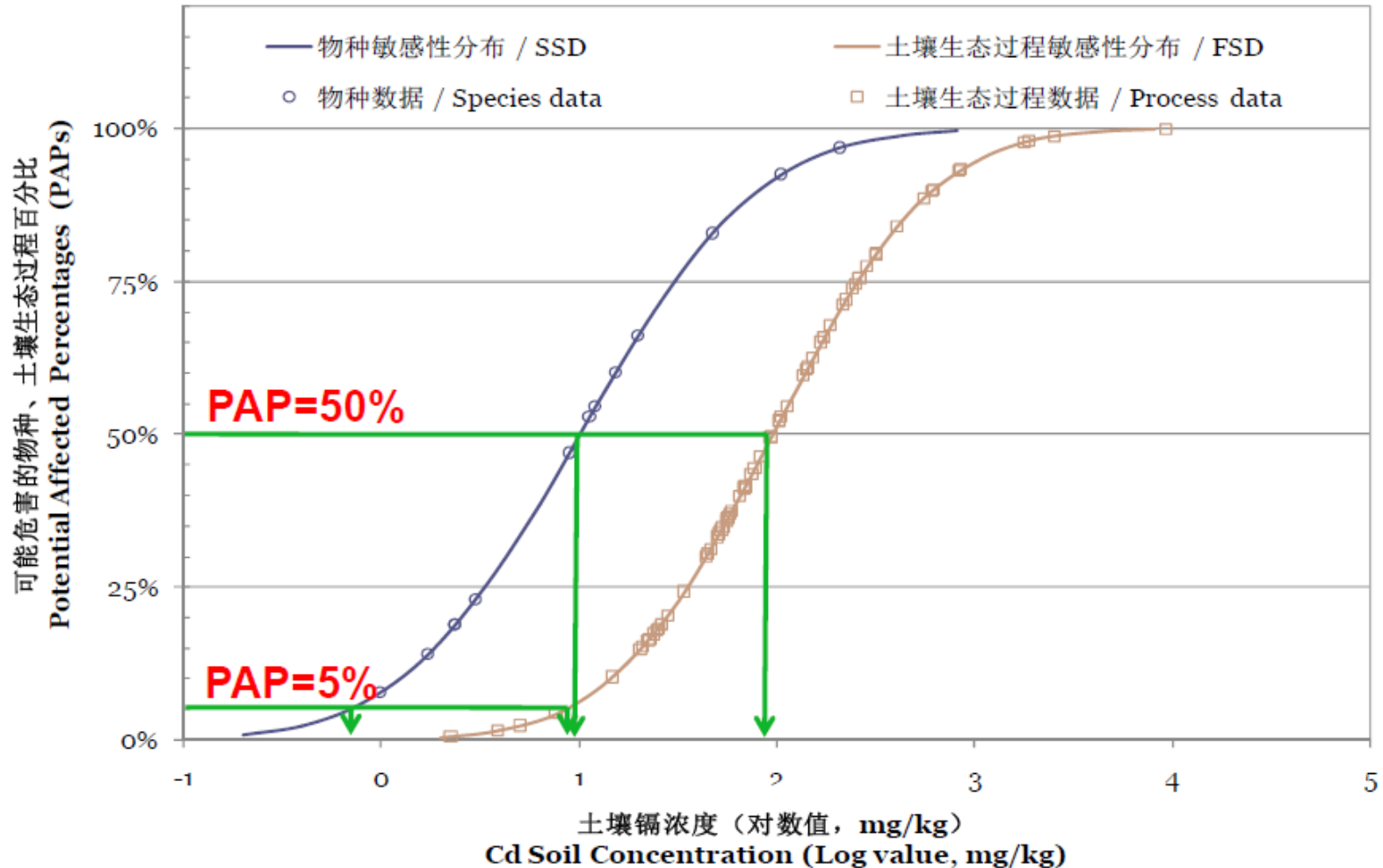
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HRA methodology



ERA methodology



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Concluding remarks

◆ **Big challenges:**

- 1) sustainable management of clean (natural, agricultural) soils,
- 2) management of slightly contaminated soils;
- 3) remediation of heavily (unacceptable risk) contaminated soils;

◆ **Urgent needs:**

—A suitable framework of Soil Environmental Standards meeting needs of soil environmental management;

◆ **The proposed framework integrating:**

- 1) **SEQSs** for sustainable soil quality management,
- 2) **SSVs** for screening of potential contamination risks/COCs, and
- 3) **SRLs** for risk management and remediation of contaminated soils;

◆ **Further studies:**

- 1) methodology/guidelines for deriving of SEQSS/SSVs/SRLs
- 2) scientific research/survey data supporting SEQSS derivation

Thank You for the Attention!



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