Progress in Sustainable Land Management Worldwide

Special Session 5cSps 2

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Animation of Sustainable Remediation

www.claire.co.uk/surfuk

subtitled into many different languages including: Chinese; Spanish; Portuguese; Russian; Modern Arabic; French; German; Hungarian; Polish; Turkish; Malaysian and Indonesian

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Debunking Myths about Sustainable Remediation

Jonathan Smith
Soil and Groundwater Technology Manager, Shell Global Solutions (UK) Ltd
Former Chair of SuRF-UK

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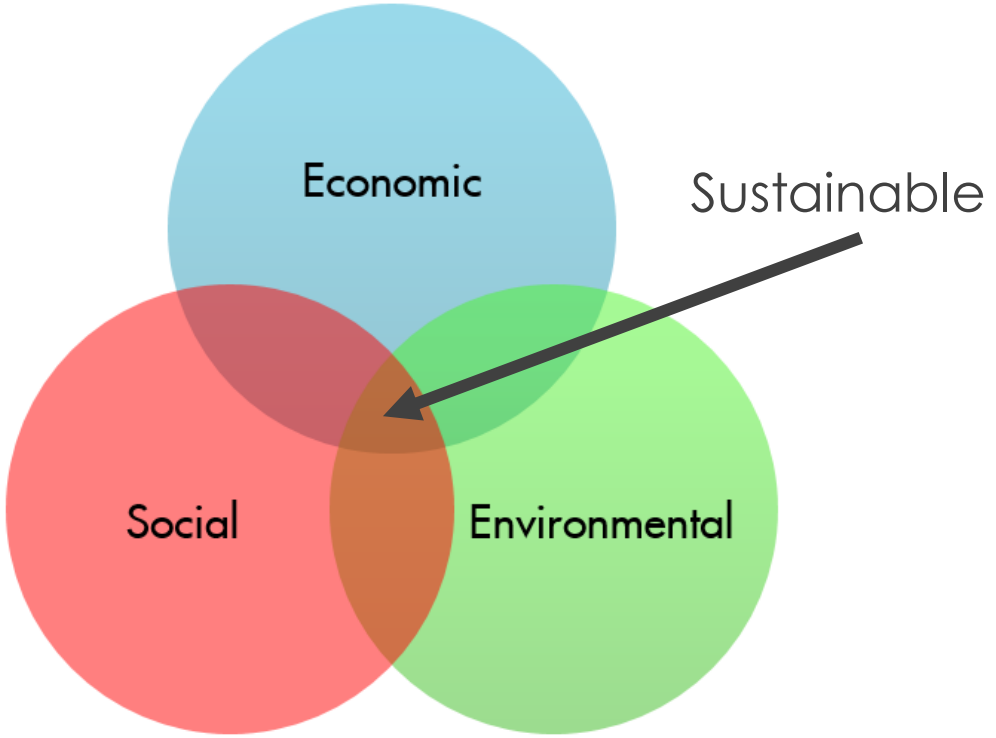
Take-away messages

- Sustainable Remediation concepts have developed rapidly in the past decade
  - SuRF-UK, and related, organizations
  - guidance has been prepared in numerous countries
  - ISO Standard 18504:2017
- The alignment in thinking necessary to develop an ISO standard also allowed joint statements of intent from practitioner and policy maker groups regarding sustainable remediation (NICOLE & Common Forum, 2013).
- Despite the consistent standards and guidance/frameworks, there continues to be occasional misunderstanding of the goals of sustainable remediation.
- This presentation collates some of the common misconceptions, inaccurate claims and statements about sustainable remediation, and presents a view from a SuRF-UK Framework/ ISO Standard author.

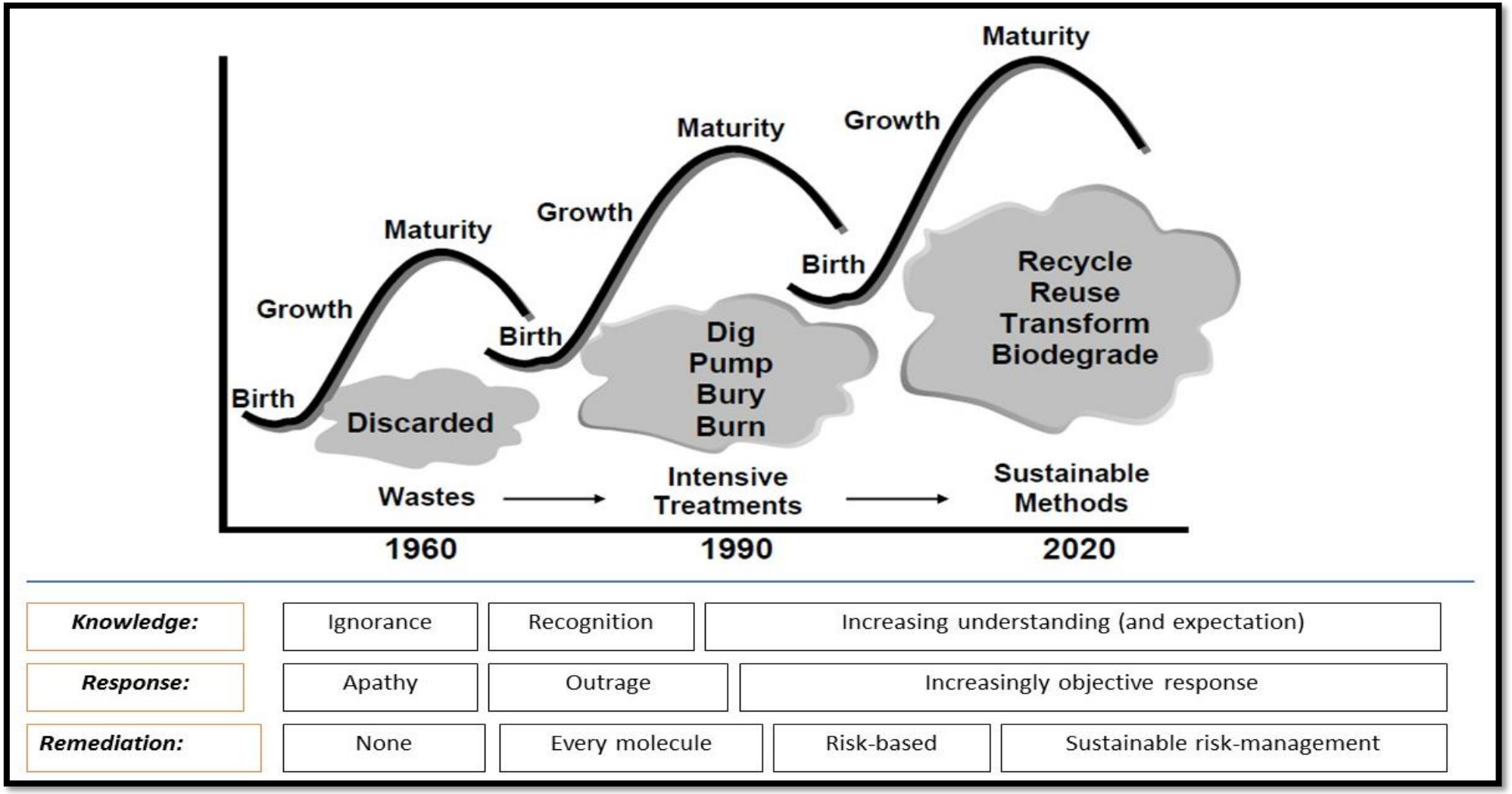
What is Sustainable Remediation?

- SuRF-UK
  - "The practice of demonstrating, in terms of environmental, economic and social indicators, that the benefit of undertaking remediation is greater than its impact, and that the optimum remediation solution is selected through the use of a balanced decision-making process."

- ISO 18504:2017
  - "elimination and/or control of unacceptable risks in a safe and timely manner whilst optimising the environmental, social and economic value of the work"



The journey


Maturity
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Birth
Discarded
Dig
Pump
Bury
Burn
Recycle
Reuse
Transform
Biodegrade
Wastes
Intensive
Treatments
Sustainable
Methods
1960
1990
2020
Knowledge:
Ignorance
Recognition
Increasing understanding (and expectation)
Response:
Apathy
Outrage
Increasingly objective response
Remediation:
None
Every molecule
Risk-based
Sustainable risk-management

Some myths about sustainable remediation

Myth 1. Sustainability means you can do less remediation and leave unacceptable risks in place

Reality:
Risk prevails over sustainability as the criteria to trigger remedial action.
Sustainability assessment informs us of the best way to manage unacceptable risks.

Myth 2. Just saying a project is 'sustainable' makes it so

Reality:
Unsupported claims bring the reputation of sustainable remediation into question.
Claims of 'Sustainable remediation' should be demonstrated by compliance with relevant best practice documents.

More myths about sustainable remediation

Myth 3. It is only about saving money

Reality:
Efficient use of capital is important, but an SR assessment also considers environmental and social considerations.
Sustainability assessment can lead to significant value creation across all three pillars of sustainability economic, social and environmental

Myth 4. Green Remediation and Sustainable Remediation are the same thing

Reality:
Sustainable Remediation and Green Remediation are not synonymous with one another. Assessors should be clear about which framework they are adopting and why.

Even more myths about sustainable remediation

Myth 5. It is a new paradigm that requires much expertise, time and expense

Reality:
Sustainable (and risk-based) management does require some skills development. However, it is not a new paradigm and draws heavily on what the contaminated site community already know and are familiar with.

Myth 6. Sustainability assessment is the same as conducting a CO_2 footprint analysis

Reality:
Sustainability assessment requires an assessor to think broadly to ensure a valid and balanced assessment.
CO_2 / GHG emissions are an important consideration, but not the only one.

Yet more myths about sustainable remediation

Myth 7. The assessment of social performance requires complex input from social scientists

Reality:

The use of existing governance structures, and fair and proper consideration of the effects of different remediation options on the range of stakeholders present is possible within existing structures and systems.

Myth 8. Sustainability can be directly and precisely measured

Reality:

It is the relative performance of the remediation options, and the selection of one, after appropriate stakeholder input, as the best or most sustainable option.

Conclusions

- Sustainable remediation assessment shows us how to manage unacceptable risks to human health and the environment in the best, most sustainable, way.
- Sustainable Remediation provides a framework to incorporate sustainable development principles into remediation projects and deliver significant value for affected parties and society more broadly.
- In debunking some myths about Sustainable Remediation it is hoped that consistent application of ISO 18504:2017/SuRF-UK framework (or equivalently robust guidance) will facilitate even wider use of Sustainable Remediation around the world.

For the full paper

Smith, JWN, 2019. Debunking myths about sustainable remediation. *Remediation J.*, http://dx.doi.org/10.1002/rem.21587

RESEARCH ARTICLE

WILEY

Debunking myths about sustainable remediation

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Abstract

Sustainable remediation concepts have evolved during the decade 2007-2017. From the establishment of the first Sustainable Remediation forum (SURF) in 2007, to publication of ASTM and ISO standards by 2017. Guidance has been developed around the world to reflect local regulatory systems, and much has been learned in applying sustainability assessment to contaminated site management projects. In the best examples, significant improvements in project sustainability have been delivered, including concurrent reduction of the environmental footprint of the remediation program, improved social performance, and cost savings and/or value creation. The initial advocates for the concept of sustainable remediation were quickly supported by early adopters who saw its potential to improve the remediation industry's performance, but they also had to overcome some inertia and scepticism from other parties. During the debates and discussions that occurred at numerous international conferences and SURF workshops around the world, various opinions were formed and positions stated. Some proved to be correct, others not so. With the recent publication of ISO Standard 18504 and the benefit of a decade's-worth of hindsight on sustainable remediation programs implementation and project delivery, this paper summarizes a number of myths and misunderstandings that have been stated regarding sustainable remediation and seeks to debunk them. Sustainable remediation assessment shows us how to manage unacceptable risks to human health and the environment in the best, that is to say the most sustainable, way. It provides the contaminated land management industry a framework to incorporate sustainable development principles into remediation projects and deliver significant value for affected parties and society more broadly. In dispelling some myths about sustainable remediation set out in this paper, it is hoped that consistent application of ISO18504/SuRF-UK (or equivalently robust guidance) will facilitate even wider use of sustainable remediation around the world.

KEYWORDS

ISO18504, SuRF-UK, sustainable remediation

1 | INTRODUCTION

The concept of sustainable remediation (SR) of contaminated soils and groundwater was first formally articulated in 2007 when the Sustainable Remediation Forum (SURF) was established in the USA. In the following decade to 2017, it progressed from the idea of a few far-sighted advocates to the mainstream in the remediation industry. It is now the subject of both an ASTM International (ASTM International, 2013) and International Organization for Standardization (ISO) standard (ISO, 2017). The application of SR has spread around the world rapidly, and guidance has been prepared in numerous countries to encourage appropriate application. These have largely been instigated by the various national SR fora (the SuRFs), as well as collaborative contaminated land-practitioner organizations such as the U.S. Interstate Technology & Regulatory Council (ITRC; www.itrcweb.org), the EU's Network for Industrially Co-ordinated Sustainable Land Management in Europe (NICOLE; www.nicole.org) and the EU Common Forum (www.commonforum.eu/) that bring policy-makers, regulators, consultants, industry, and academia together (Exhibit 1). The alignment in thinking necessary to develop an ISO standard also allowed joint statements of intent from practitioner and policy maker groups regarding SR (NICOLE & Common Forum, 2013).

SURF ANZ Key Activities and Future Plans

Promoting Sustainable Remediation in Australia and New Zealand

SuRF ANZ Key activities and future plans

Elimination and/or control of unacceptable risks in a safe and timely manner whilst optimising the environmental, social and economic value of the work

John Hunt, Ventia & SuRF ANZ

Paul Nathanail, LQM & SuRF ANZ

Peter Nadebaum, GHD & SuRF ANZ

Tony Scott, Coffey & SuRF ANZ

SuRF ANZ - An ALGA Interest Group

- ALGA Sustainable Remediation Interest Group - **SuRF ANZ**
- Independent member of International Sustainable Remediation Alliance (ISRA)
- Committed to development and promotion of sustainable remediation practices in contaminated land and groundwater projects
- 2019 Steering committee (appointed annually):
  - **Tony Scott** (Coffey Environment) Chair
  - Dr Fouad Abo (GHD)
  - Tanya Astbury (Viva Energy)
  - Ian Batterley (Senversa)
  - Mitzi Bolton
  - Scott Carroll (Tellus Holdings)
  - Dr John Hunt (Ventia)
  - Ciaran Lavery (Arcadis)
  - Dr Peter Nadebaum (GHD)
  - Dr David Tully (Contaminated Land Solutions)
  - Kristin Wasley EPA Vic
  - Louise Wilson Jacobs NZ

The steering committee is also assisted by: Ryan Gilbert (Eurofins), Therese Hammond (GHD), Geordie McMillan (Environ Earth Sciences), and Dr Paul Nathanail (LQM)

Overall

Overall objective of SuRF ANZ is to achieve the situation that:

Applying the principles of Sustainable Remediation is recognised as a necessary part of developing a site remediation and management strategy, is written into formal regulatory requirements, and is a normal part of responding to site contamination.

When this is achieved, there will no longer any need for SuRF ANZ.

We are not there yet.

Our committee meets monthly with this in mind.

Strategy

- Promote awareness, need for, and knowledge of how to apply Sustainable Remediation
- Embed SR within the merging National Remediation Framework (NRF)
- Embed SR within Infrastructure Sustainability Council of Australia (ISCA) ranking and certification process for major infrastructure projects
- Engage with Green Building Council of Australia and assist them in recognising SR on property developments as part of their rating scheme
- Encourage application of ISO 18504 in Australia and internationally.
  - Run technical seminars in Australia and New Zealand
  - Share SURF ANZ program with international partners
- Work with Standards Australia to adopt ISO 18504 as an Australian Standard.
- Reinforce that SR is *how* to remediate not whether or how much to remediate

SuRF ANZ Technical Seminars

- 180 delegates over three weeks at 8 Australian cities – extend to New Zealand
- Introduced ISO 18504 to clients, consultants and regulators; links with the National Remediation Framework (NRF) and sustainability of major infrastructure projects
- Presentations by Infrastructure Sustainability Council of Australia (ISCA) – mandatory for large projects
- Presentations by Sustainable Remediation award winners
  - E.g. Coffey project - solar pumping and heating for enhanced in-situ hydrocarbon remediation
- Presentations by State Regulators
  - All refer to sustainability; very positive on relevance and application of the ISO and the NRF
  - Some already carry out internal appraisals of sustainability of remediation proposals
  - Some expect to be directly referring to the ISO and the NRF
- ISO 18504 reassures regulators that SR approach has international support; will be helpful in applying SR when remediating and managing contaminated sites.

National Remediation Framework and Sustainable Remediation

Linear decision basis:

- Comply with legal requirements
- No unacceptable risks to human health and the environment during remediation and after remediation

Feasible options – then consider sustainability (cost benefit)

- Transparent decision making based on evidence and science
- Good governance and stakeholder involvement

Established a Sustainable Remediation Prize

Awarded at Annual ALGA Gala Dinner

Primary criteria:

a. Remediation project largely finalised within last 2 calendar years including the entry submission year (or policy, if evidence of it having influenced projects is provided) in Australia or New Zealand
b. Significant attention to environmental, economic and social components
c. Entry includes a description of a conceptual relationship to SuRF ANZ or international SR framework(s) or to ISO 18504:2017 on Sustainable Remediation
d. Evidence of significant sustainability outcomes

Additional criteria:

a. Evidence of specific social and environmental improvement and economic benefit
b. Evidence of beneficial brownfields development attributes
c. Evidence of engagement of the project with regulatory practice requirements or a local jurisdictional regulator
d. Evidence of meaningful engagement with the community.

Identifying benefits of adopting a sustainable remediation approach

Making the case that it offers a competitive advantage

Encourages

- broader view and balancing of issues
- Identifying, confronting and gaining acceptance of risk
  - Can reduce cost, usage of resources, offers other benefits such as avoiding unnecessary wastage and providing for future uses eg agriculture
- Satisfy Government and client requirements for sustainability

Particularly: lower cost, lower energy use, less use of resources

Developing a SR Strategy: Project Specific Checklist

Requirement	Specific components for consideration
Project framing: project objectives and constraints	Conceptual Site Model Statement on objectives Regulatory requirements Risks that need to be addressed
Identify and engage relevant stakeholders	Stakeholder engagement plan
Agree format and scope for sustainable remediation assessment	Confirm objectives and risk drivers with stakeholders Agree on regulatory requirements Project assessment boundaries (spatial, time) Agree Assessment approach (qualitative/quantitative) Agree Indicators and metrics

Requirement	Specific components for consideration
Identify options to break source-pathway-receptor linkages	Identify options and combinations of options that are likely to meet regulatory requirements and have an acceptable residual risk
Undertake sustainable remediation assessment	Consultation with stakeholders Revisit objectives and constraints if necessary Reconsider options and combinations of options if necessary
Select preferred remediation strategy	Consult and agree with stakeholders that key regulatory requirements and risks will be addressed, and that expected outcome will offer overall benefits and will be acceptable
Develop implementation plan	Plan should include requirements for implementation, monitoring, maintaining, validate

Final comments about ***Sustainable Remediation***

- Tremendous opportunity!
- Encourages
  - thinking through the issues when developing remedial strategies for each site
  - a more rigorous approach to considering the issues
  - audit the process to confirm that policies and guidance have been considered
- Reduces risk that poor remedial strategies will be adopted (eg by vested interests)
- Improves on current (erratic) approach to remediation - Formalises, makes more transparent and regularised, practice applied (irregularly) to many sites
- Reduces cost and usage of energy and resources
- Maintains social licence to operate/develop site

Parallels between ISO 14001:2015 and the SuRF-UK Framework



Parallels between ISO 14001:2015 and the SuRF UK Framework

Complementary Objectives to support an existing Environmental Management System

- Hayley Thomas – Shell Global Solutions International BV.
- Frank Evans – National Grid

Contents

- Introduction
- ISO 14001:2015 and Sustainability
- SuRF UK Framework
- Identifying Synergies
- Conclusions

Introduction

- SuRF UK provides a framework which allows the sustainability of remediation strategies to be evaluated (considering environmental, social and economic factors).
- While the SuRF UK framework is routinely used by some environmental practitioners and well informed land owners, there remains scope to further embed the approach within the contaminated land arena.

- This presentation will seek to identify synergies between the SuRF UK Framework and the widely popular international environment management standard ISO 14001:2015.
- Identification of the commonalities will allow both practitioners and problem holders to leverage mutually beneficial practices to drive enhanced environmental performance whilst contributing to sustainability.

ISO 14001:2015 and Sustainability

- ISO 14001 provides organizations with a framework for developing environmental management systems (EMS) to support protection of the environment and respond to changing environmental conditions in balance with socio-economic needs.

- In 2015 the standard was revised. There is now an increased emphasis on how ISO 14001:2015 can support sustainable development, including a focus on how environmental management can influence an organizations strategic thinking, encouraging better environmental performance and environmental protection (including use of resources and demands placed on the environment) as well as supporting consideration of a life cycle perspective.

- Certification to ISO 14001 has grown to over 350,000 organizations globally, with over 100,000 organizations certified within Europe.

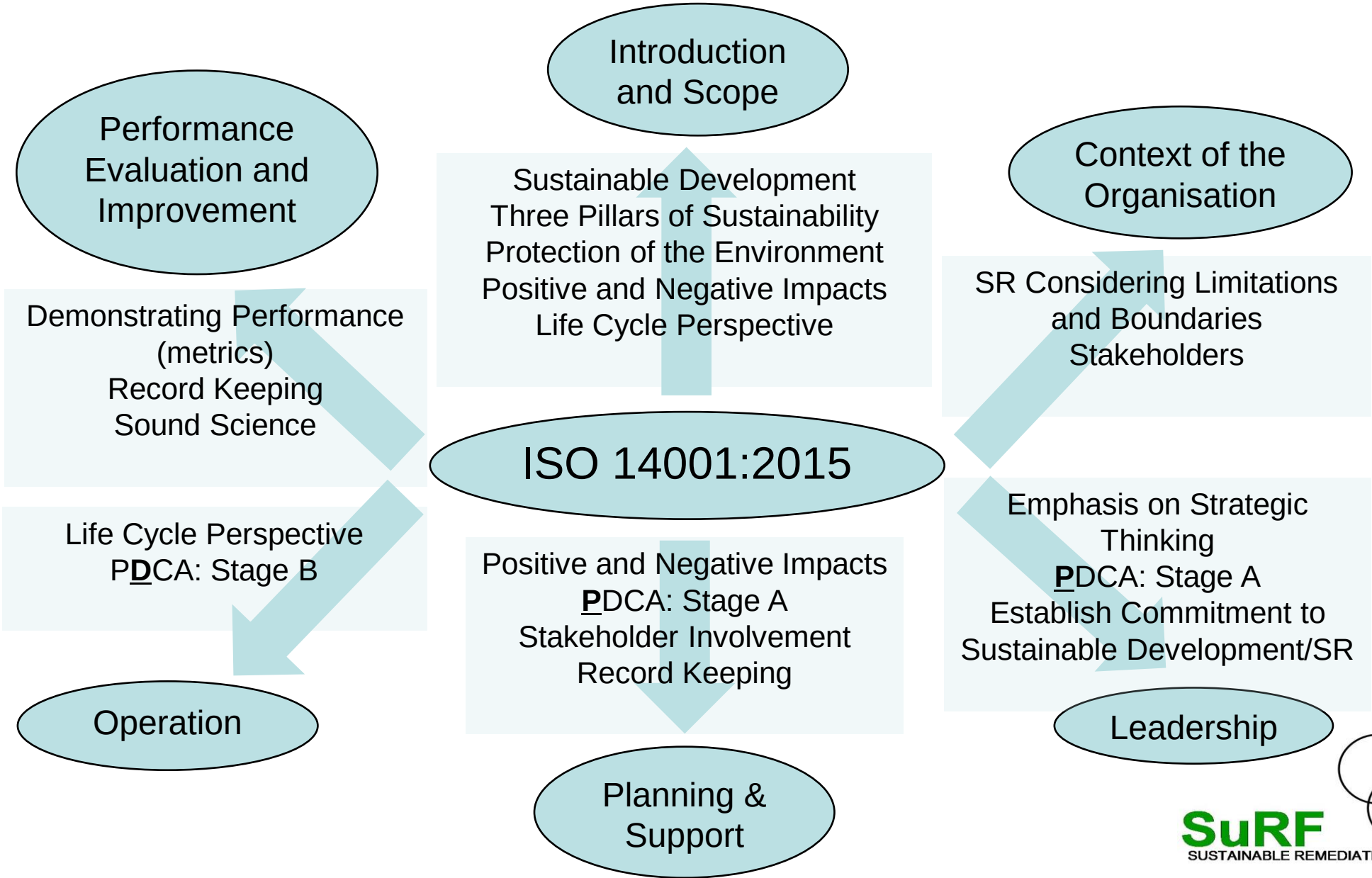
SuRF UK Framework

- The process of identifying sustainable remediation is defined by SuRF-UK as “the practice of demonstrating, in terms of environmental, economic and social indicators, that the benefit of undertaking remediation is greater than its impact and that the optimum remediation solution is selected through the use of a balanced decision-making process.”
- SuRF-UK identifies a number of key principles that are associated with sustainable remediation. The key principles are:
  - Principle 1: Protection of human health and the wider environment.
  - Principle 2: Safe working practices.
  - Principle 3: Consistent, clear and reproducible evidence-based decision-making.
  - Principle 4: Record keeping and transparent reporting.
  - Principle 5: Good governance and stakeholder involvement.
  - Principle 6: Sound science.
- The SuRF UK approach is reflected in ISO 18504:2017, which is widely applicable where regulatory frameworks allow.

Identifying Synergies

14001:2015 content summary	Synergies (14001 and SuRF UK)	14001:2015 content summary	Synergies (14001 and SuRF UK)
Introduction & Scope	- Both reference **Sustainable Development** and the **three pillars of sustainability** (environmental, social and Economic). - Shared Principles regarding **protection of the environment** (Principle 1) and consideration of a **life-cycle perspective**. - Integrated Environmental Management – SuRF UK provides a clear implementable approach for demonstrating remediation does not result in unintended impacts to the environment.	Planning & Support	- Organizations need to determine the 'Environmental Aspects" which can have a **significant environmental impact** considering a **life cycle perspective**. Adopting the concepts of sustainable remediation ensures the recognition of both the **positive and negative impacts** of remediation. - Requirements on organizations to define 'Environmental Objectives' is an opportunity commit an organization to following a process of sustainable remediation. - **Communication** requirements within ISO 14001 presents an opportunity for stakeholder management approaches in sustainable remediation projects to be linked into communication goals of an ISO14001 compliant environmental management system. - **Documented** information is a requirement of ISO14001 and is aligned with Principle 4 of SuRF-UK framework.
Context of the Organisation	- Understanding the context of an organization provides a high-level opportunity to consider its commitment to sustainable remediation and associated limitations and boundaries. - The strong requirement for the identification of relevant **interested parties** as well as their needs and expectations is aligned with SuRF UK Principle 5 (Good governance and **stakeholder engagement**).	Operation	- ISO14001 requires control of processes in line with their environmental management system and with regard to a **life cycle perspective** - Plan – Do – Check – Act Model: Compatible with the SURF UK definitions of **'Stage A' (Plan)** and '**Stage B' (Do)** and the need to monitor and validate (Check) an implemented remedial strategy.
Leadership	- Application of the SuRF UK framework can easily establish a commitment to **sustainable development** within an organizations Environmental Management System (EMS). - SuRF UK's recognition that sustainability wins can be achieved in both the 'plan/project' design phase of projects ('Stage A') and the 'remediation implementation' stage of a project ('stage B') is aligned with requirements for **strategic thinking** at the 'top management' or leadership level of an organization.	Performance Evaluation & Improvement	- Monitoring, measuring, analyzing and evaluating **environmental performance** of an organization's activities is a requirement of ISO14001. It would also be an expectation of any organization carrying our sustainable remediation and aligns to SuRF UK Principles 4 and 6.

Identifying Synergies



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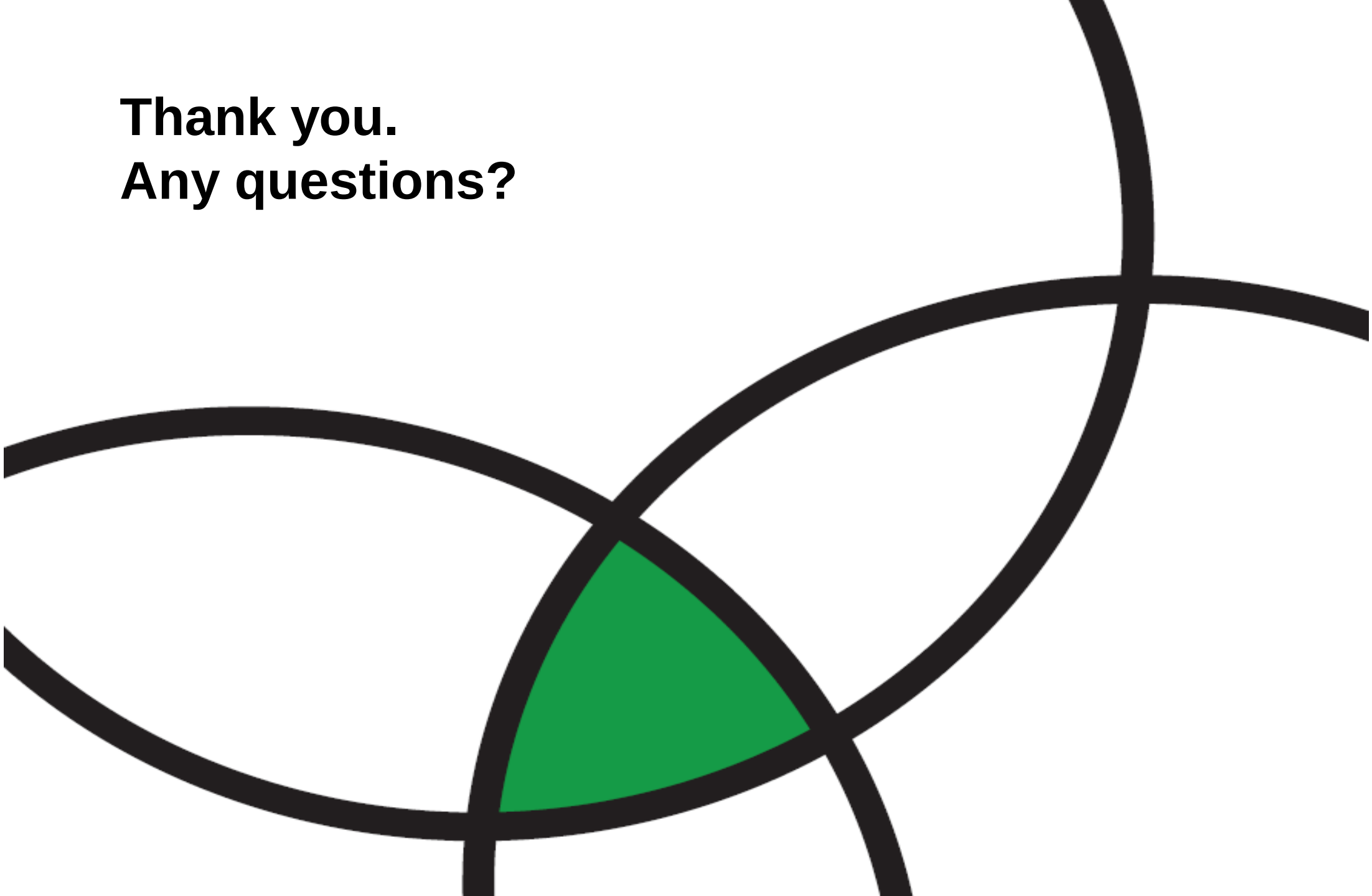
Conclusions

- Land owners or practitioners with existing certification to ISO 14001 can strengthen their EMS by embedding sustainable remediation practices in their projects.
- This is best done by following relevant SURF guidance (where available) or the ISO Standard on Sustainable remediation (ISO 18504:2017).
- Synergies apply in both directions:
  - ISO14001 compliant organizations are likely to be thinking about environmental sustainability-factors already and can easily incorporate them into remediation projects;
  - Organizations that already adopt Sustainable Remediation frameworks can strengthen their environmental / sustainability performance, link it more directly to an EMS and easily demonstrate it through SR project documentation.
- Wider European and Global uptake of SR principles can be supported given the broad applicability of ISO documentation (ISO 14001:2015 and ISO 18504:2017).

Thank you.
Any questions?



How to manage the huge amount of radio-Cs contaminated soil in Fukushima (more) sustainably?

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How to manage the huge amount of radio-Cs contaminated soil in Fukushima more sustainably?

Tetsuo Yasutaka[1] and Paul Bardos[2]

[1]National Institute of Advanced Industrial Science and Technology and chair of SuRF-JAPAN

[2] r3 Environmental Technology Ltd

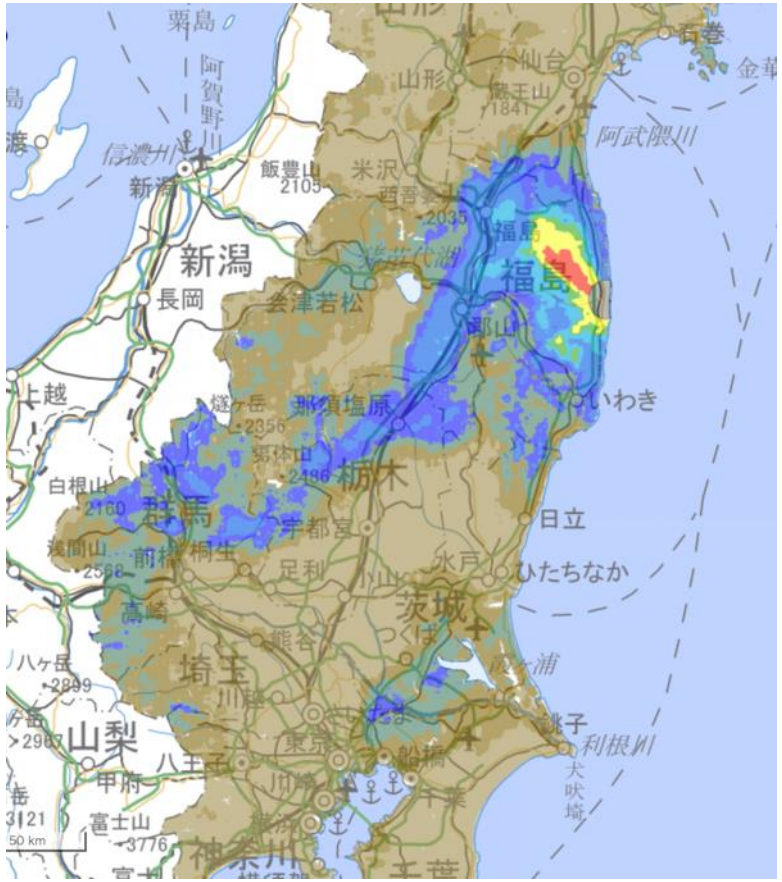
If you need the information of the SuRF-JAPAN, please go to poster 5C-01!

This presentation is not the work of SuRF-JAPAN but the case study of the application of SR.

Fukushima Daiichi Nuclear Power Plant Accidents in 2011

Radioactive materials are diffused in the environment.

Contamination Map in 2011



https://ramap.jmc.or.jp/map

Extension site of Distribution Map of Radiation Dose, etc

Decontamination Process(2012-2017)

In order to recover the environment,
decontamination work was carried out from 2012 to 2017.

1. To remove the contaminated soil and various materials.
2. To pack the contaminated soil and other materials in the Flexible Containers.
3. To move the soil to temporary storage sites near the decontaminated area and keep them for a 3-7 years

The volume of contaminated soil is

About 13 million ton

Decontamination Process(2012-2017)

1. To remove the contaminated soil and various materials
2. To pack the contaminated soil and other materials in the Flexible Containers.
3. To move the soil to temporary storage sites near the decontaminated area and keep them for a 3years

Interim storage facility(2015-2045)

4. To move the Flecon packs to interim storage facility near the Nuclear Plant and keep them for 30 years.

Final disposal facility (2045-)

5. The final disposal site of the contaminated soil will take place outside the Fukushima prefecture until 2045 (a decision by the Japanese Cabinet in 2011 and 2012)

Environmental problem

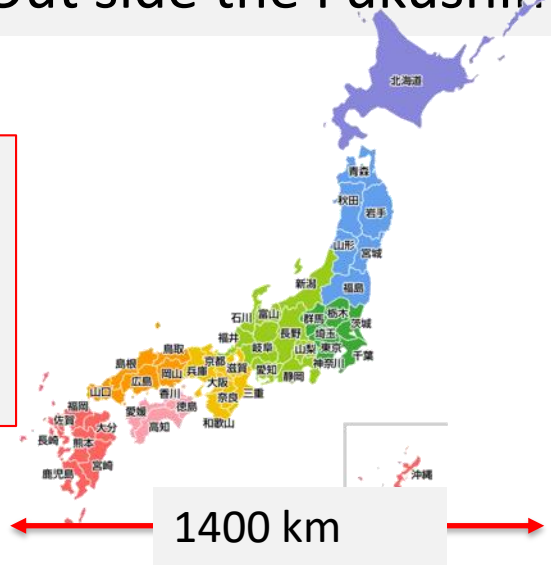
2019

Interim storage site

2045

Final disposal site.
Out side the Fukushima

Transport 13 million ton of soil



- Environmental burden of excavation, transportation of the soil and built the final disposal site (CO_2 emission, land use, energy consumption, etc)
- Almost all soil will be clean after 100-300 years because of the half live of Cs137 is 30 years.

Economical problem

How much is the decontamination cost?

47 billion €

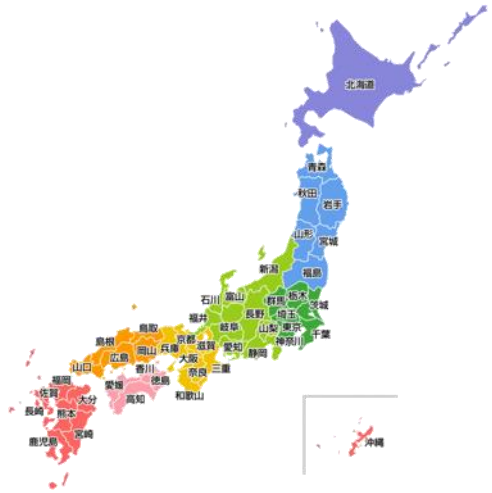
(This cost not include the final disposal site)

https://www.env.go.jp/jishin/rmp/conf/law-jokyo06/lj06_mat02.pdf

Social problem

How to select the place of the Final disposal site

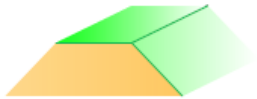
Interim storage facility



Final disposal facility

- How to develop the stakeholder consensus building to select the final storage site?

Preliminary SR evaluation:

		ENVIRONMENT	SOCIAL	ECONOMY
Option1 Government approach	Move the contaminated soil to the final storage site which built outside Fukushima Pref.	・High environmental Burden 1 ・Difficulty of the Con. Building 1	・Government keeps promise 5 ・The place may not be decided by the deadline 2	・The most expensive option 1
Option2 Re-use Approach	Re-use the the low level contaminated soil as road construction materials.  盛土材	・Low environmental Burden and reduce the use of clean soil 5 ・Difficulty of the Con. Building 1	・Government promise 3 ・Confliction with residents near the re-use place	・The cheap option 4
Option3	T.B.D.	T.B.D.	T.B.D.	T.B.D.

Conclusion

I think the current situation is not sustainable both environment, social and economical aspect.

We have to find more sustainable solution using SR concept during next 10 years.

SuRF-JAPAN

SuRF-JAPAN was established in June 2016.

Member

Main Member:
- 14 Private Company
- 8 personal members
  - Consulting Company
  - Construction Company
  - Real estate evaluation Com.
  - Industry
- 1 local government
  - Tokyo metropolitan gov.

Scientific advisory board
4 person from Univ.

Observer
-MOE (Ministry of Environment)

Secretary:AIST

Activities

Research Meeting
2-3 / Year

WG1
Green
Remediation WG

WG2
Sustainable
Remediation WG

The purpose of SuRF-JAPAN is to discuss the need of sustainable remediation in Japan and establishing necessary framework and tools

Resilient Land Remediation

Resilient Land Remediation

Addressing Extreme Weather and Climate Change, Creating Community Value

AquaConSoil
24May 2019

Barbara Maco
Vice President Emeritus
Sustainable Remediation Forum US

SURF
SUSTAINABLE REMEDIATION FORUM

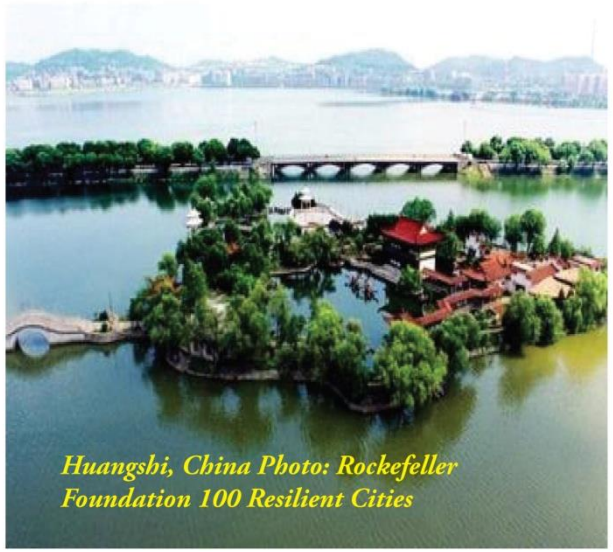
Climate Change & Extreme Weather

- Flooding
- Storm Surge
- Wild fires
- Drought
- Etc.

Post Harvey 14 Toxic waste sites, including the Highlands Acid Pits, Texas,
Photo: Associated Press

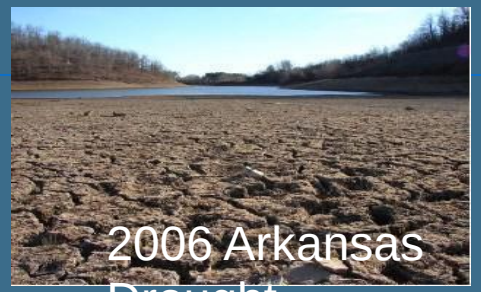

Campfire Paradise, CA
(Justin Sullivan/Getty Images)


Coal ash spilled by Hurricane Florence coats a turtle in Cape Fear River, North Carolina.
PETE HARRISON / EARTHJUSTICE


Huangshi, China Photo: Rockefeller Foundation 100 Resilient Cities

Assessment & Remediation Challenges

- Could undermine remediation design
- Could Affect
  - Contaminant toxicity
  - Exposure
  - Organism sensitivity
  - Fate and transport
  - Long-term operations, management, stewardship



2006 Arkansas Drought

- Liability for damages will likely remain with RP/land owners
- Failure to consider social vulnerability could compromise remediation & adaptation strategies and public support

Duke Energy site, North Carolina 2018

SURF Resilient Remediation Report (12/18)

State of the art assessment & protocols

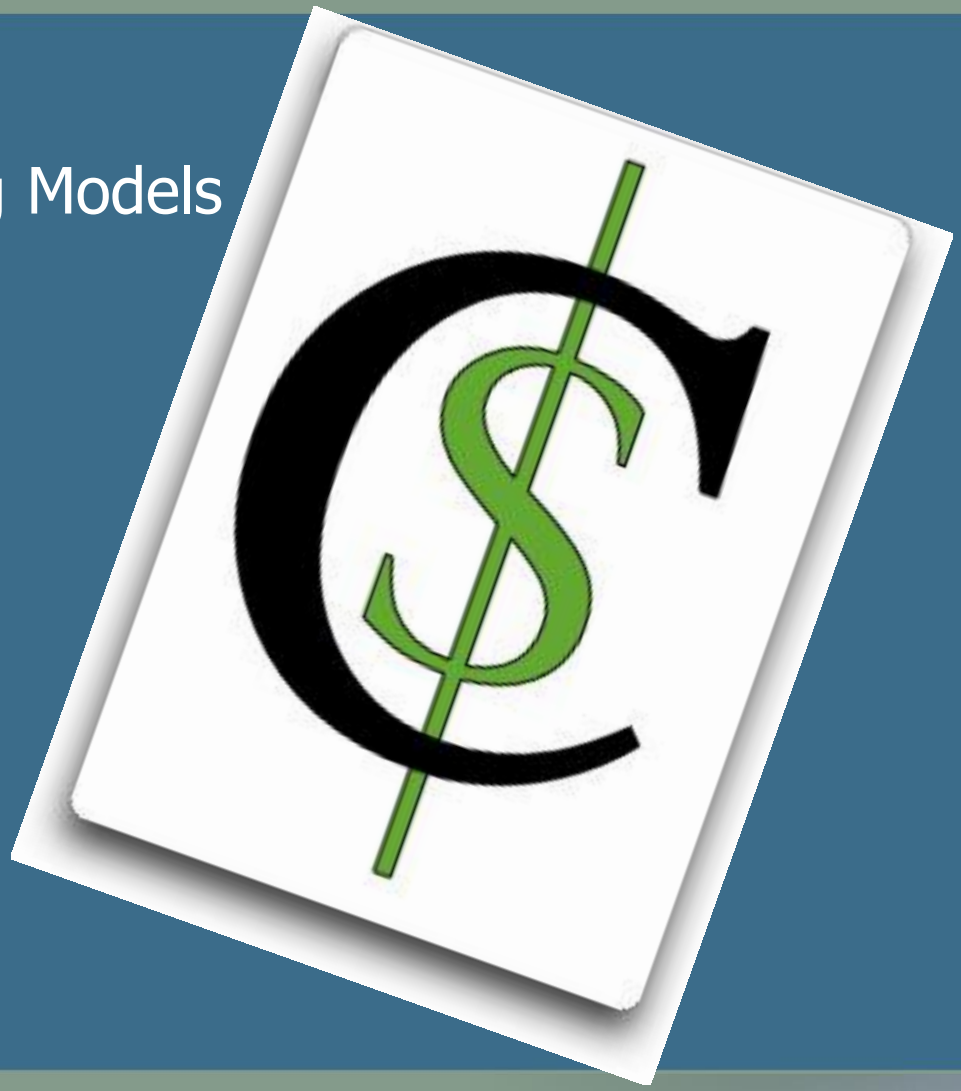
- EPA Superfund and Brownfield guidance
- CA State Integrated Climate Adaptation Strategy
- Washington State Site Specific Guidance
- International SuRFs: updated indicators & conceptual site models

Recent Resources

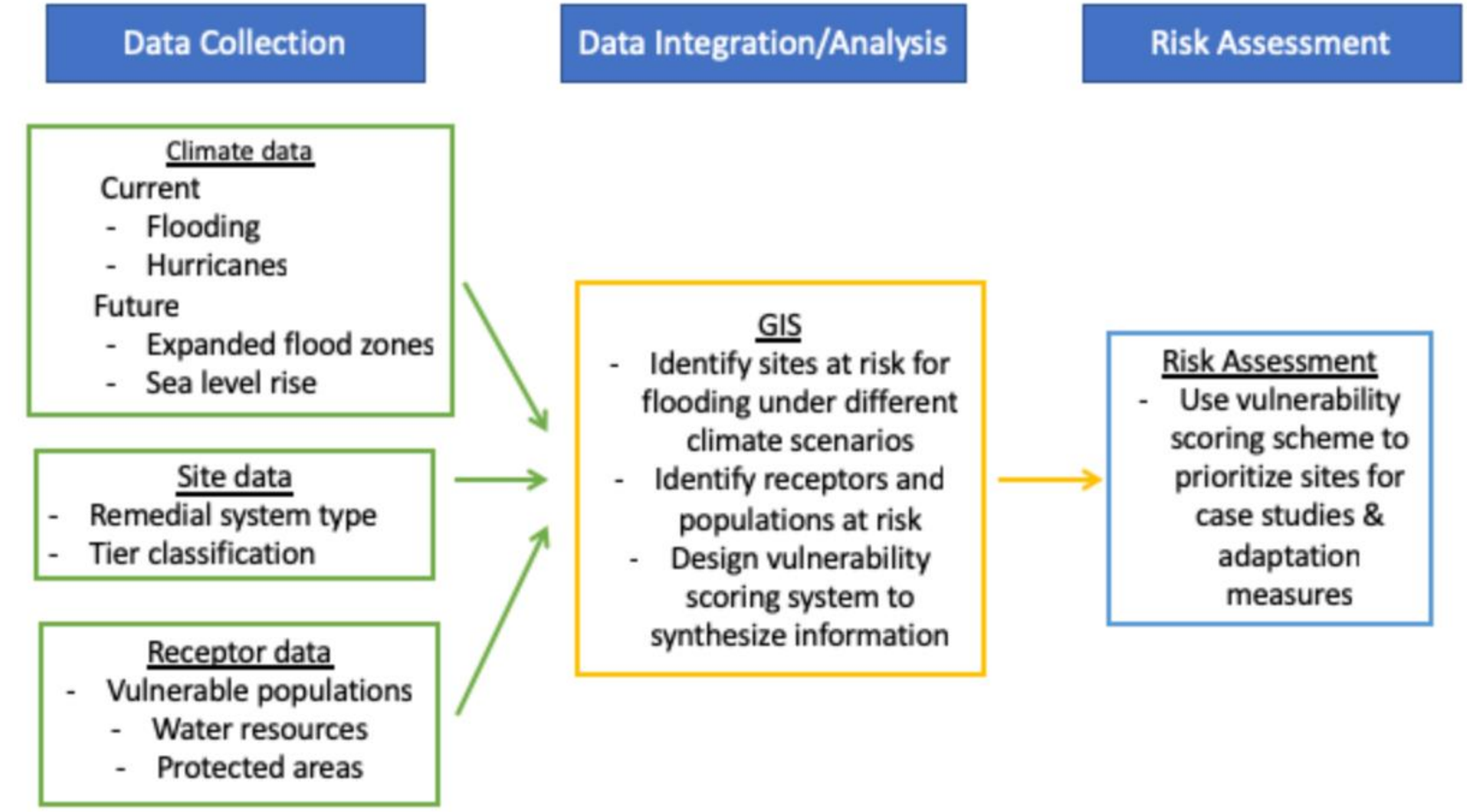
- SURF 10 SR year white paper
- Defense installations resiliency
- Interstate Technology and Resource Council GSR/Resiliency Team

Assessing Value & Implementation Strategies

- World Bank Innovative Financing Models
- EU HOMBRE/Brownfield Matrix
- UK Land Trust Natural Capital Initiative
- Nature Based Solutions
- UN Anticipate Adsorb Reshape
- Local & State Resiliency Plans

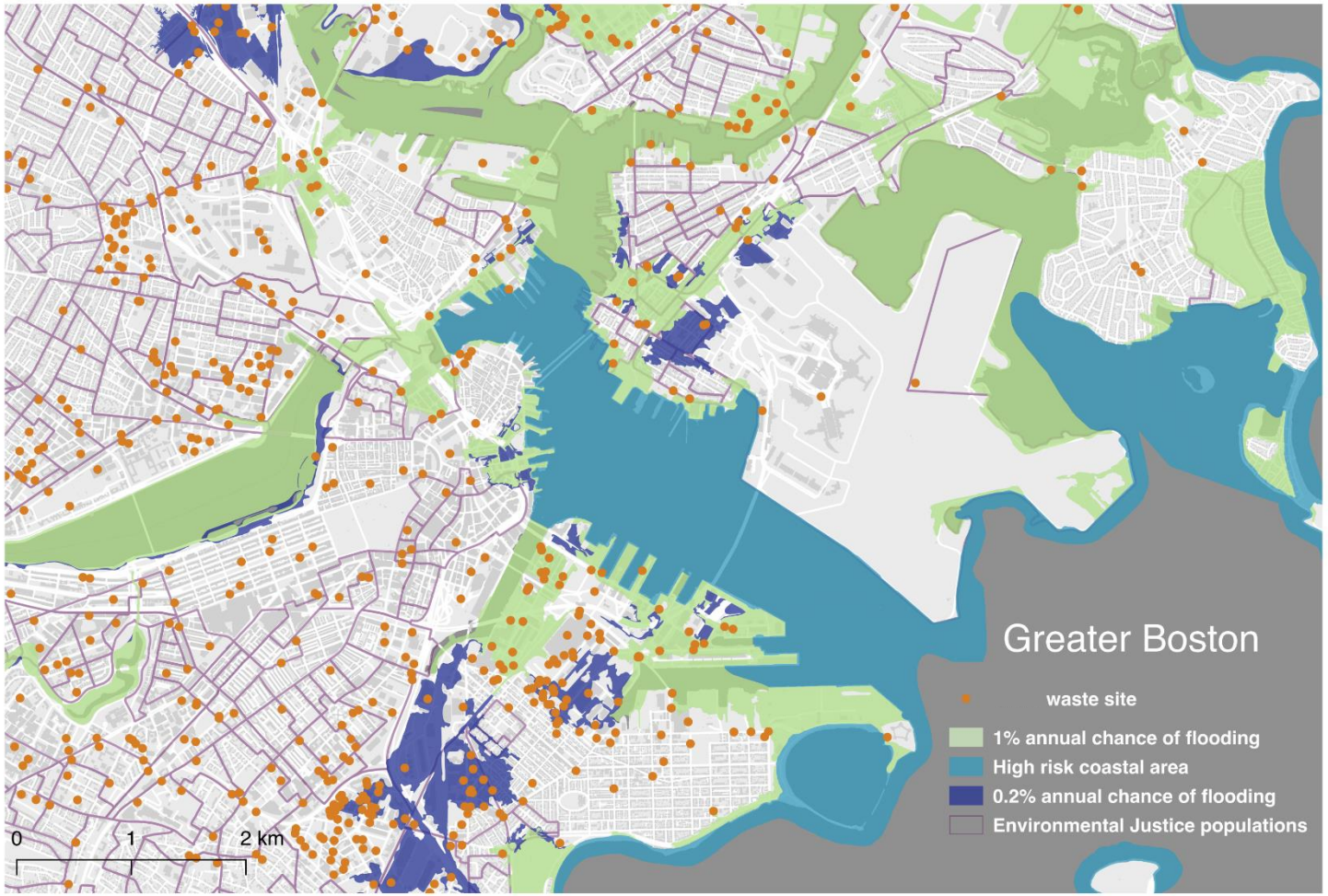


SURF Inaugural Pilot Process



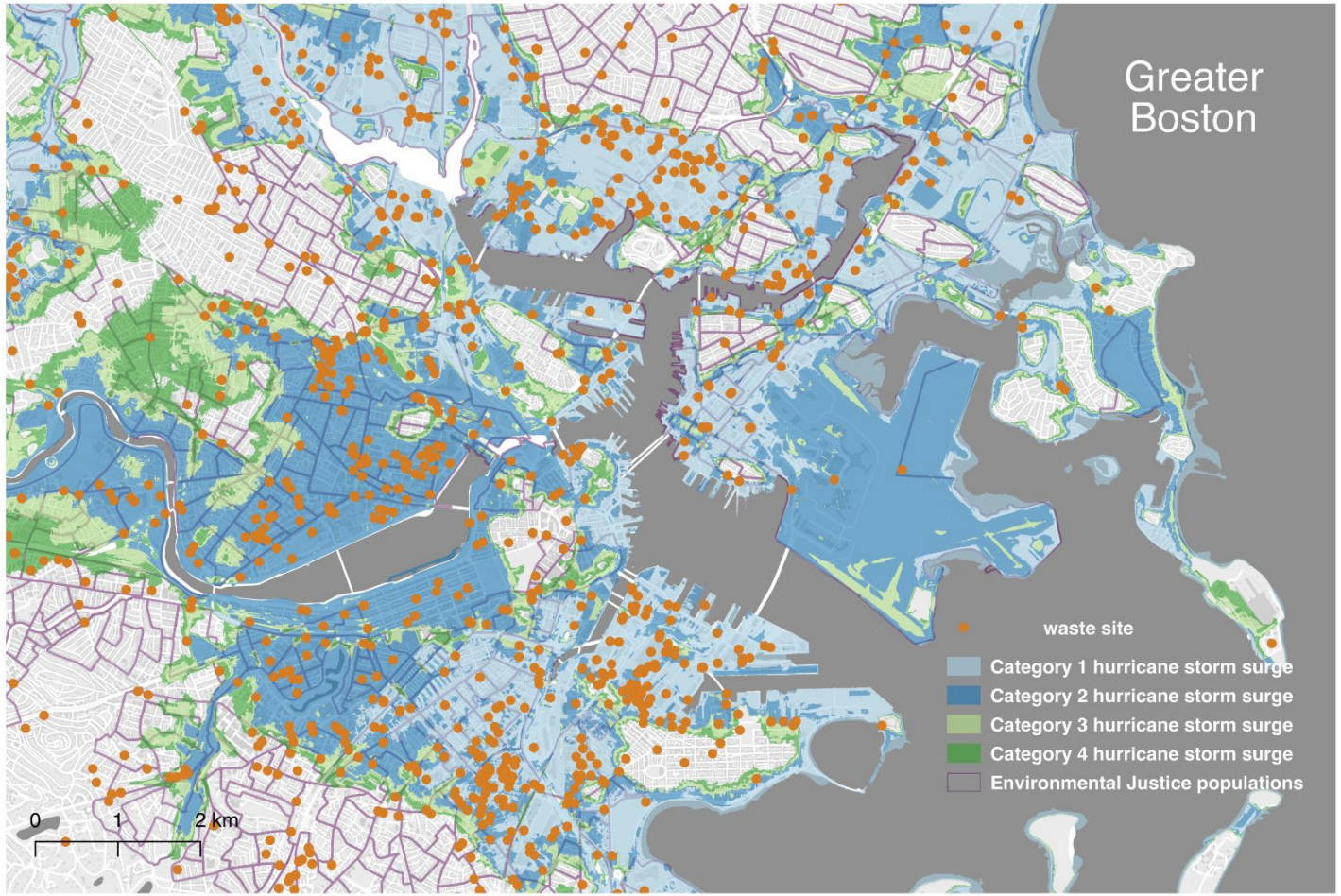
Workflow for Massachusetts waste site vulnerability risk assessment pilot project (phase I)

SURF Inaugural Pilot Project



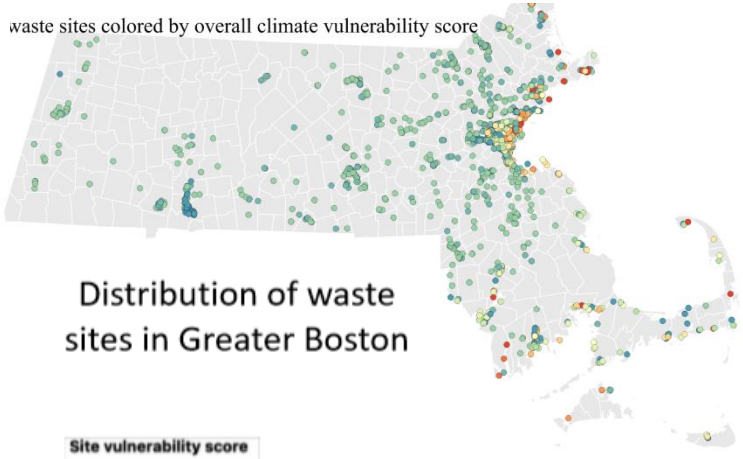
Current flood risk (FEMA)

SURF Inaugural Pilot Project



Current hurricane inundation risk (National Hurricane Center/U.S. Army Corps of Engineers)

SURF Inaugural Pilot Project



Site vulnerability score

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14

Sites vulnerability =
flooding risk exposure + site sensitivity

Addressing Extreme Weather & Climate Change, Creating Community Value

For further information:
Barbara Maco, MBA, Sustainable Management
barbara.maco@sustainableremediation.org

Transition in Soil Quality Management

SuRF SUSTAINABLE REMEDIATION FORUM UK

SuRF SUSTAINABLE REMEDIATION FORUM NETHERLANDS

NICOLE Network for Industrially Contaminated Land in Europe

FÓRUM BRASILEIRO DE REMEDIAÇÃO SUSTENTÁVEL

SuRF-JAPAN SUSTAINABLE REMEDIATION FORUM JAPAN

SuRF Italy Forum per la Sostenibilità applicata alle Bonifiche Sustainable Remediation Forum

SURF SUSTAINABLE REMEDIATION FORUM COLOMBIA

SURF SUSTAINABLE REMEDIATION FORUM

ALGA Australasian Land & Groundwater Association 10 YEARS & BEYOND Sustainable Remediation

SuRF FORUM SUR LA RÉHABILITATION DURABLE

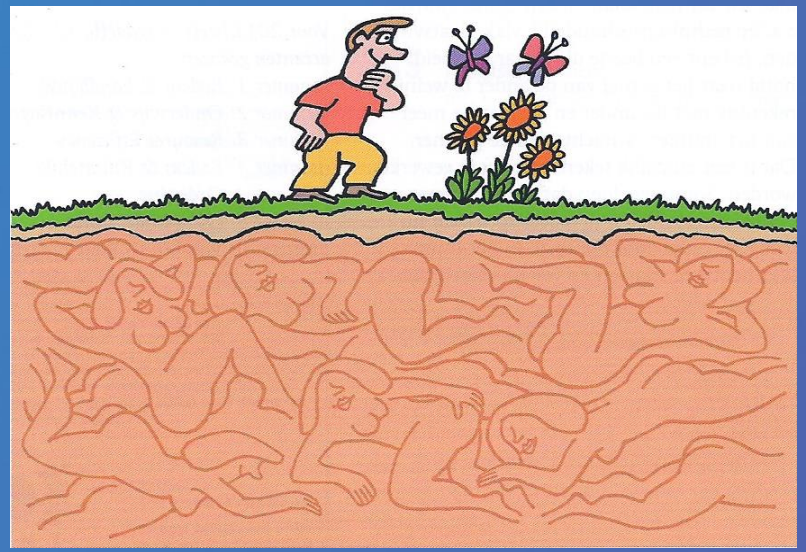
SuRF SUSTAINABLE REMEDIATION FORUM

SURF TAIWAN

Transition in Soil Quality Management

Soil – Natural Capital

Laurent Bakker
Director Soil and Groundwater Tauw Group

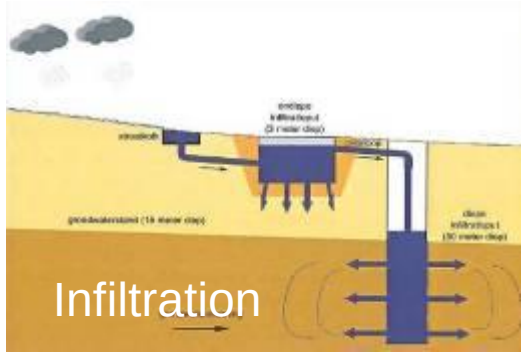


Soil = beautiful

Soil = strong and healthy

The subsoil = getting crowed

Coordination + communication = needed



Climate change

Multiple functions

Soil independent

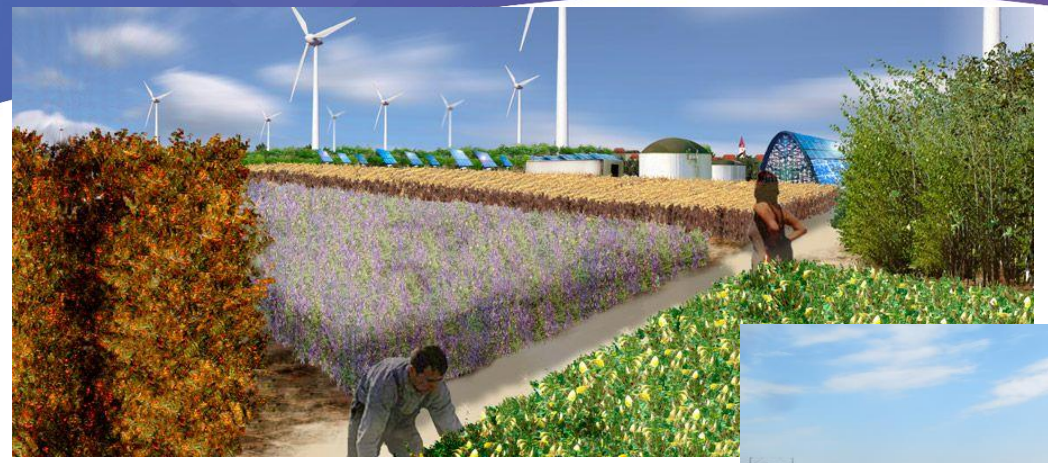
New building concepts?

Or high and dry?

Wadi: waterstorage/infiltration/green

Green roofs

Energy and sustainability



Compact building - groundwater oriented?

Underground + Energy as new settling factor?


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Opportunities

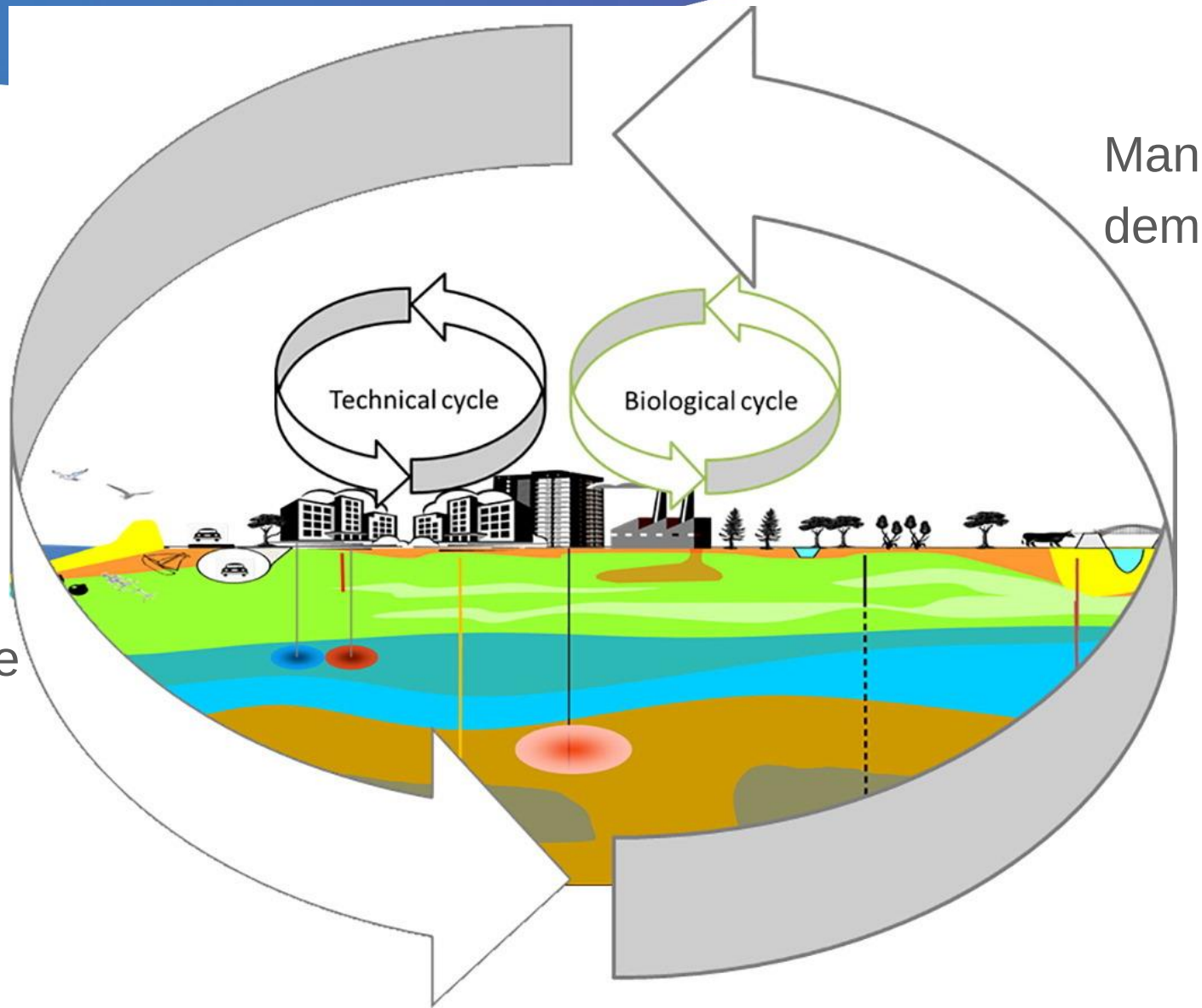
Threads

Stockholm Resilience Center

Graphics by Jerker Lokrantz/Azote

Land Stewardship – Circular Economy

Management of resources
demand / production



Land management
Economic use / reuse

Eco system services

Soil Health

Soil that is capable of fulfilling its natural functions is known as healthy soil. Healthy soil:

- *guarantees good food production due to natural and sustainable fertility;*
- *protects both groundwater and food crops against high concentrations of contaminants and fertilisers, by performing as an optimum filter;*
- *offers a good structure and thereby regulates the water management of both agricultural soils and in an urban environment;*
- *is an important reservoir for carbon and stores CO2 in organic matter essential for the soil;*
- *has a rich and diverse soil life (high biodiversity)that sustainably maintains the above functions;*
- *offers capacity and space for human activity such as building and energy storage.*

In short, a healthy, naturally functioning soil-water system delivers a huge range of functions that form the basis for practically all societal challenges.


Be the
Change
You wish to see in the
World

SuRF
SUSTAINABLE
REMEDIATION FORUM
NETHERLANDS

Contact

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www.bodembreedforum.nl/themagroep-surf-nl-sustainable-remediation-forum

Advancements of Sustainable Remediation in China

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SURF TAIWAN

中国科学院南京土壤研究所

Institute of Soil Science, Chinese Academy of Sciences

Advancements of Sustainable Remediation in China

SuRF-China

Prof. Mengfang Chen

Outline of the Presentation

- Status of Soil Remediation
- Key Progress Milestones
- Soil Management Procedures
- Summaries and Expectations

Status of Soil Remediation

Soil Pollution Seriously Threatening Food Safety and Health

"National Soil Pollution Survey" Published in April 2014

- Medium-Heavily Polluted Agricultural Soil Reaching 50m Acres
- 36.3% of Soil Polluted within and Surrounding Abandoned Industrial Sites
- Soil Pollution is Deteriorating Characterized by a Mixture of Contaminants

Status of Soil Remediation

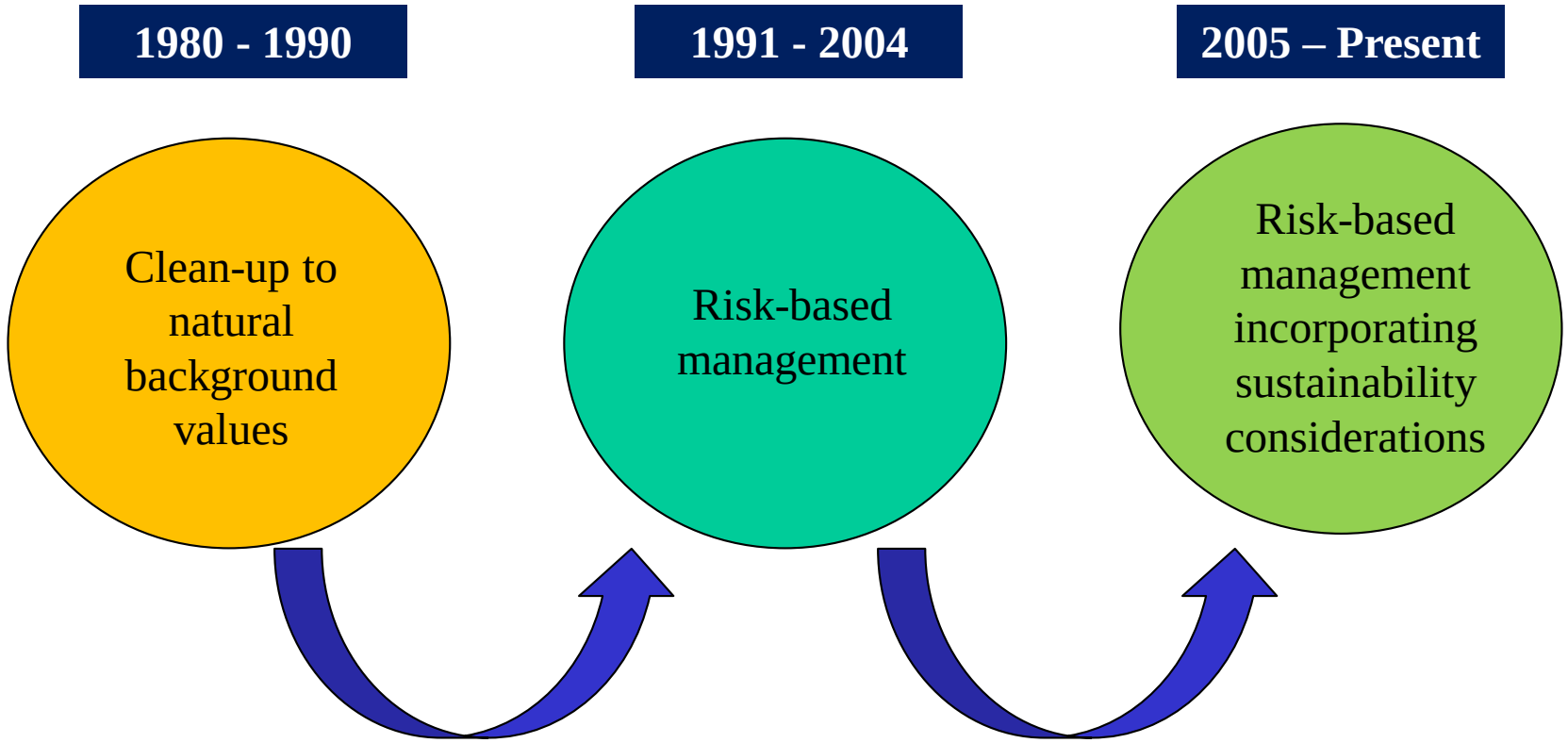
Relocation of Contaminated Industries Being Intensified

- From 2004 to 2008, No. of shut and relocated industries increased sharply
- >20,000 contaminated industry relocated including chemical, pesticide manufacturing, leather production, metallurgical and oil refineries etc
- National Brownfield Market Size: (US $100-1000B)

Excluding operational sites, petrol stations, landfills, oil fields and mining regions

Status of Soil Remediation

Evolution of Contaminated Land Management Framework



Complete Clean-up and Mass Reduction
1. Difficult to achieve technically
2. May not be necessary to prevent harm
3. Uses finite resources

Increasing concern about sustainability issues and increased understanding that the impacts of remediation needs to be balanced against the benefits

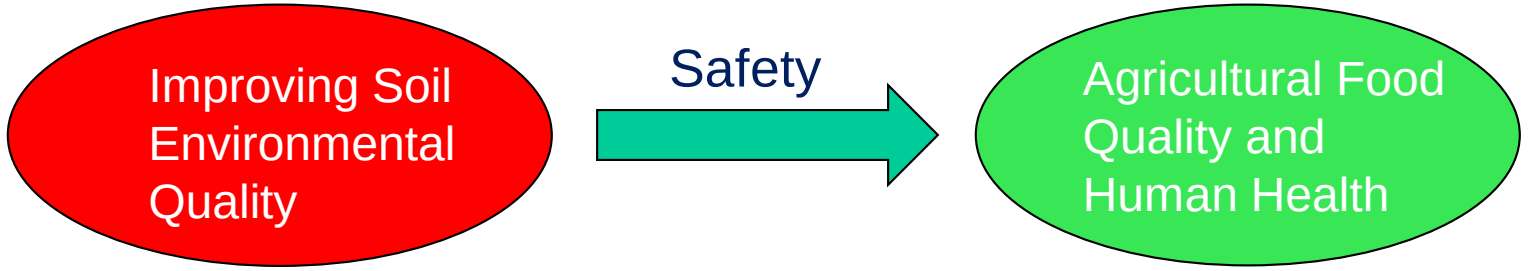
Modified from © CL:AIRE www.claire.co.uk/surfuk

Key Progress Milestones

Working Towards Sustainability of Soil Remediation

Key Progress Milestones

Primary Considerations: National Soil Pollution and Prevention Action Plan (2016)

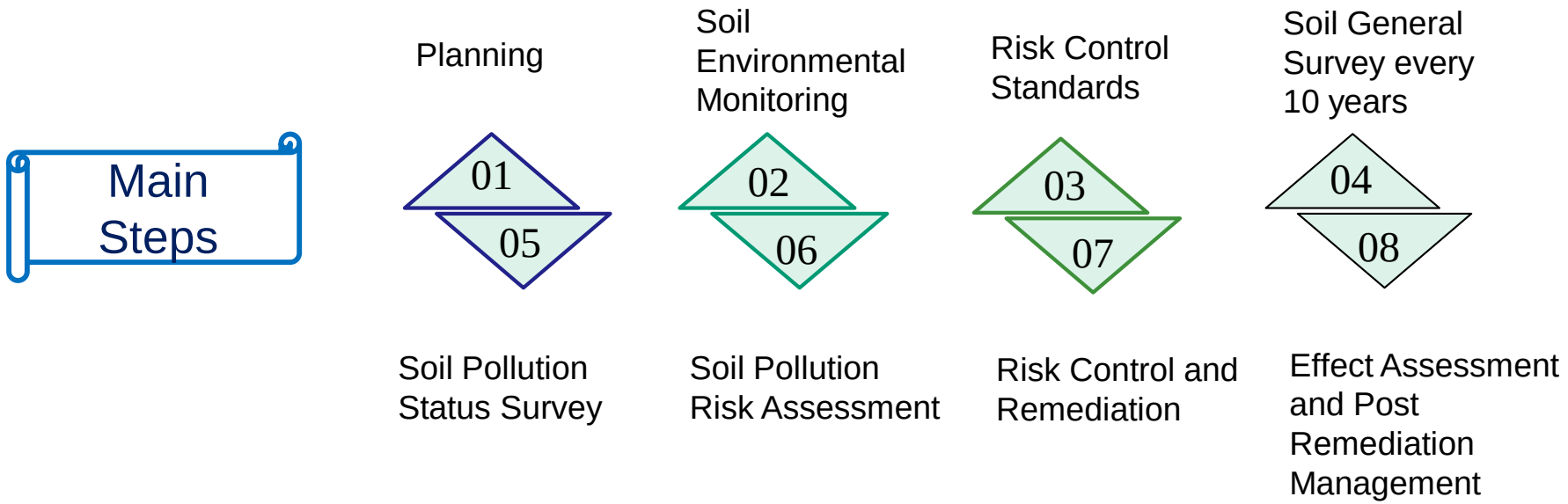


Principles	Prevention and Protection Priorities, and Secondary Risk Control
Focuses	Key Regions, Industries and Contaminants
Modes	Classified, Purposed and Staged Remediation
Methods	Strictly Control New Contaminants and Reduce Existing Mass
Systems	Government Control, Industrial Responsibility, Public Participation and Society Monitoring
Objective	Ever Sustainable Use of Soil Resources

Target Safety Utilization Rates for Polluted Paddy Fields and Contaminated Lands are Set to 90 and 95% Respectively in 2020 and 2030

Key Progress Milestones

Primary Considerations: Soil Pollution and Prevention Law (2019)



Key Progress Milestones

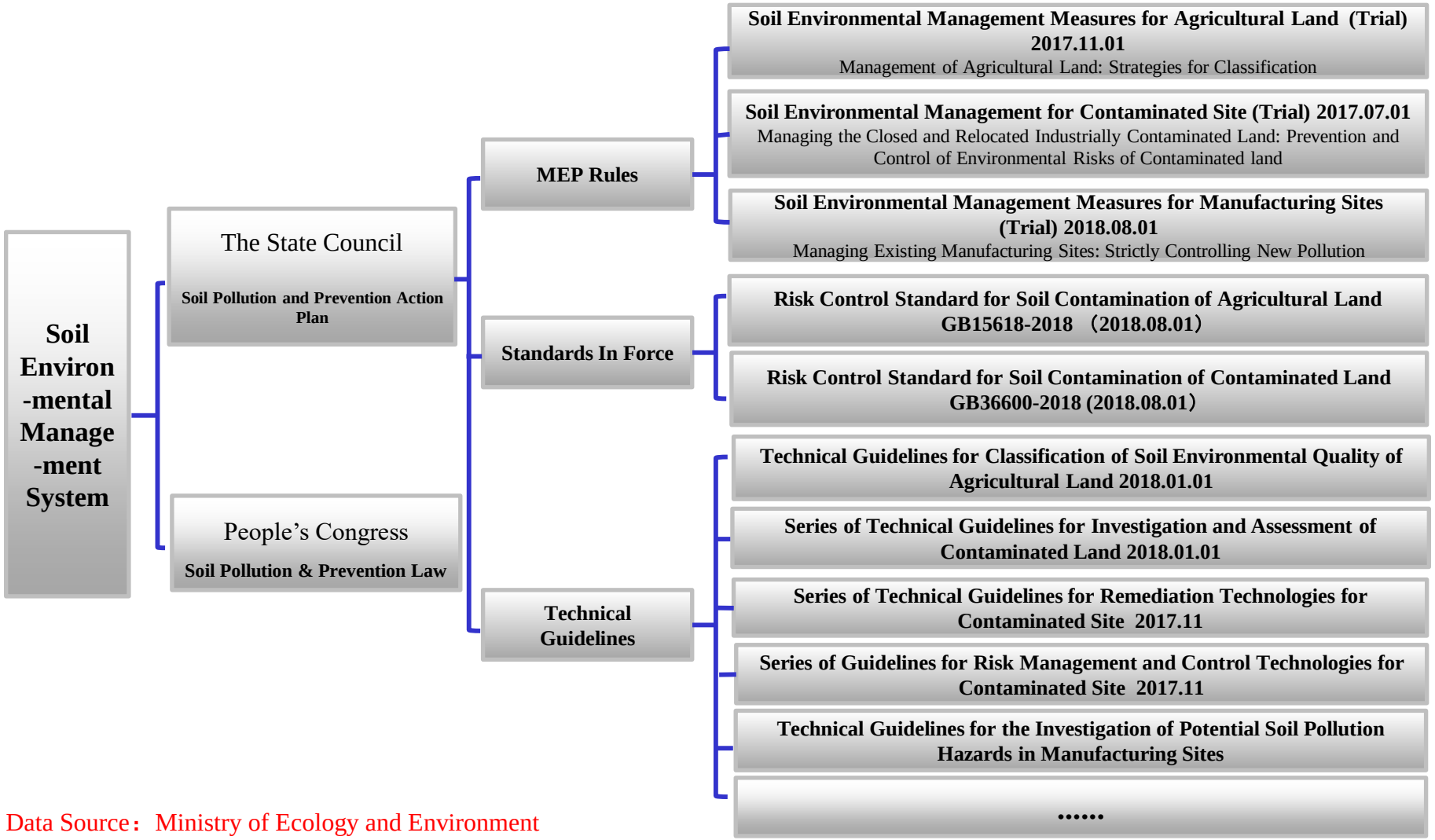
Key Industries Regulated

- Oil Fields
- Metal Mining
- Metallurgical Refinery
- Coking and Gasworks
- Chemical Industry
- Leather Production
- Soil Waste Sites
- Pulp and Paper Industry
- Electro-plating
- Electrical and Electric Industries

Covered by National Soil Pollution and Prevention Action Plan, Soil Pollution Survey and Key Research Programme

Soil Environmental Management Procedure

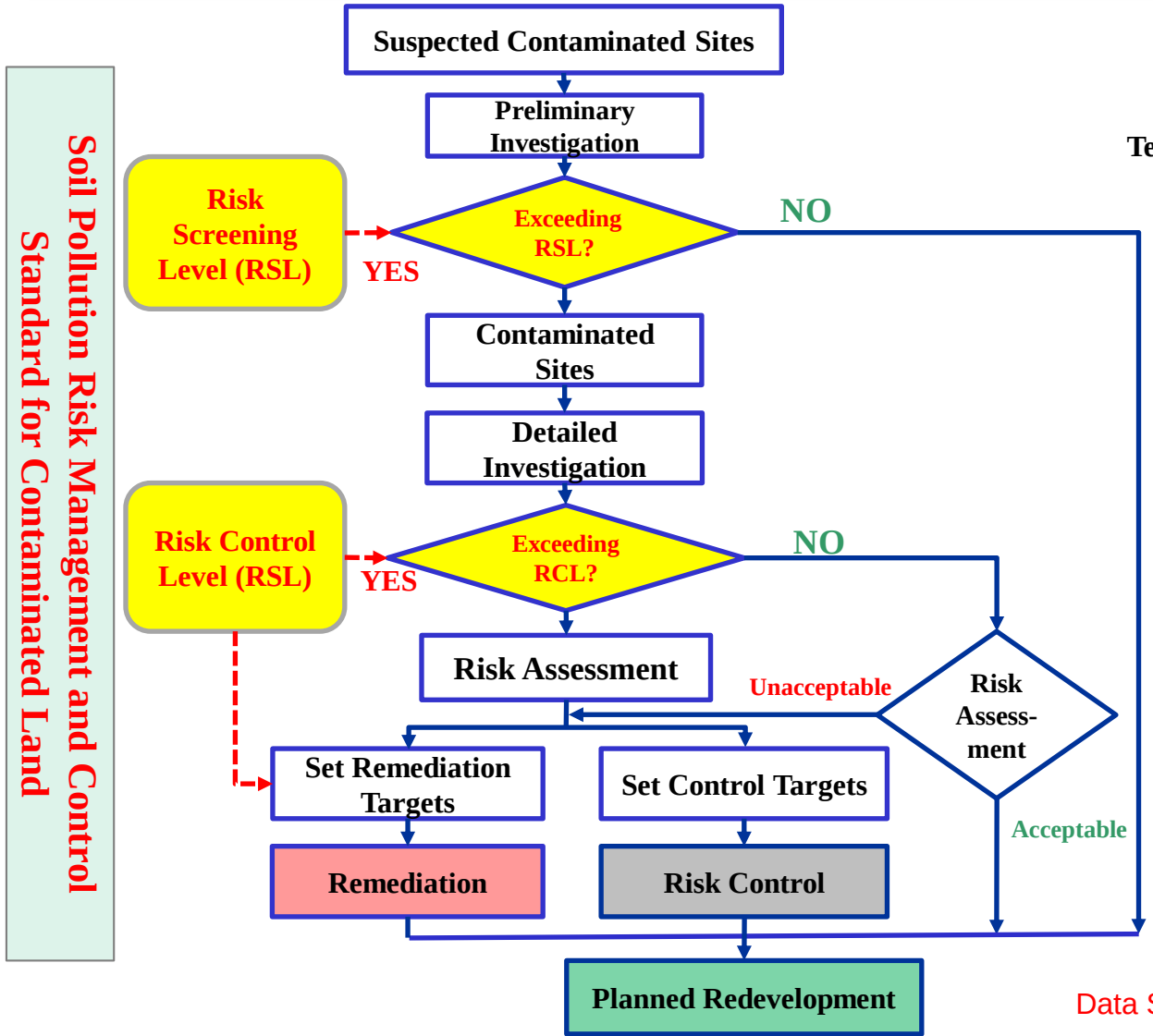
National Soil Environmental Management Framework



Data Source: Ministry of Ecology and Environment

Soil Environmental Management Procedure

Soil Pollution Management Procedure of Contaminated Land



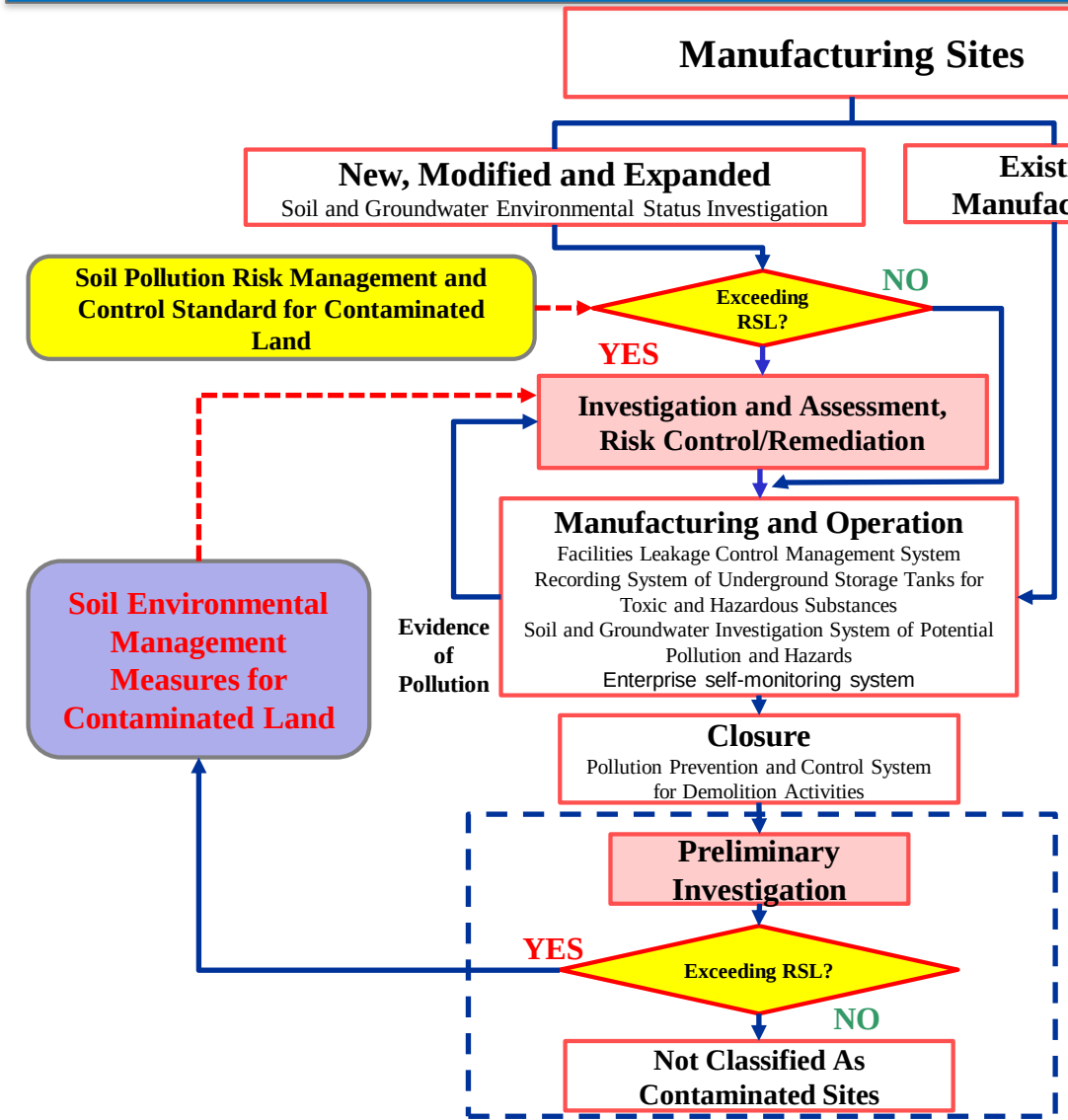
Technical Specification for Contaminated Land

- HJ 25.1-2014 Technical Guidelines for Environmental Site Investigation
- HJ 25.2-2014 Technical Guidelines for Environmental Site Monitoring
- HJ 25.3-2014 Technical Guidelines for Risk Assessment of Contaminated Sites
- HJ 25.4-2014 Technical Guidelines for Soil Remediation of Contaminated Sites
- HJ 25.5-2018 Technical Guideline for Verification of Risk Control and Soil Remediation of Contaminated Site
- Technical Guidelines for Soil Environmental Investigation and Assessment of Contaminated Land 2018.01.01
- ……

Data Source：Ministry of Ecology and Environment

Soil Environmental Management Procedure

Soil Pollution Management Procedure for Manufacturing Sites



Technical Specification for Manufacturing Sites

- Technical Guidelines for the Investigation of Potential Soil Pollution and Hazards for Manufacturing Sites
- Technical Guidelines for Soil Environment Self-Monitoring for Manufacturing Sites
- Technical Regulations on Pollution Prevention and Control in Manufacturing Site Demolition Activities
- Technical Specification for Preventing Spillage and Leakage of Underground Storage Tanks and Other Facilities
- Technical Guidelines for Soil Environmental Investigation and Assessment for Contaminated Land
- ……

Data Source：Ministry of Ecology and Environment

Summaries and Expectations

- New Laws and Regulations Demand for Concerted Actions on Both Management and Risk Control, and Remediation of Contaminated Land
- Opportunities for Applications of High-Precision Site Investigation, Detailed Quantitative Risk Assessment and Development of Cost-Effective In-Situ Technologies
- Expectations of Technological Growth and International Cooperation due to Governmental Funding Programme
- Eventually Leading to Risk-Based Sustainable Remediation

Thank You
for Your Attention

Questions & Discussion

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