



REMTECH EUROPE International Conference

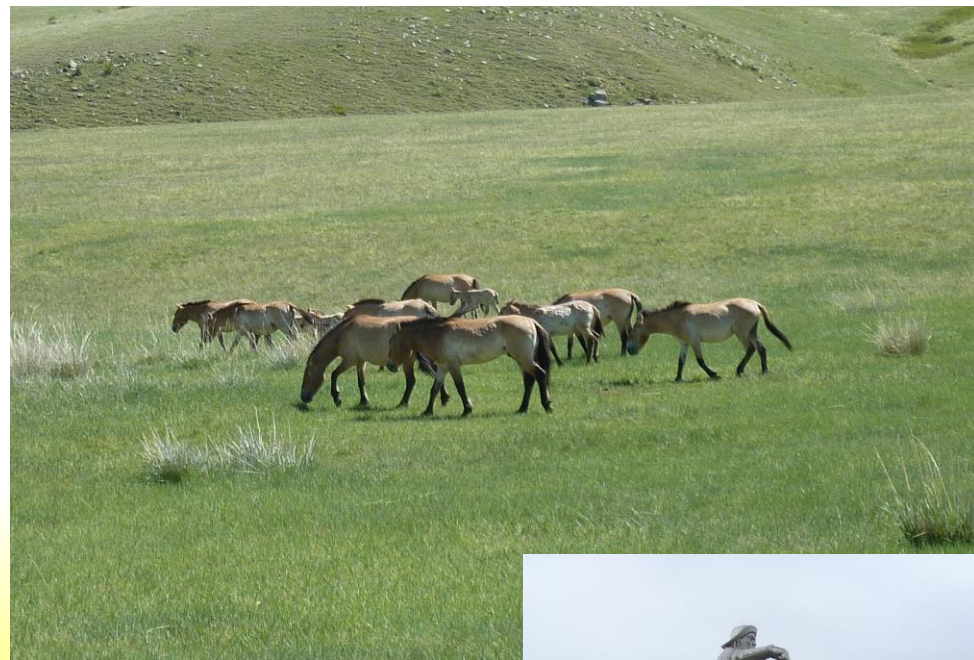
**Management of contaminated sites
in Slovakia and Mongolia
due to former Soviet army activities**

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Mongolia




Establish the GeoDatabase on ecological health of the military sites

- Introduce with the international practice on developing methodology of investigation and establishing GeoDatabase for identifying the ecological situation in/around military sites
- Design and implement GeoDatabase on ecological status of military sites, especially those which are used by Soviet army during 1970 – 1990
- Diagnose and assess the level of contamination and degradation of military sites
- Develop scientific justifications for decontamination and rehabilitation of degraded military sites
- Project duration: 2013 – 2016
- Budget source: NATO (Science for Peace and Security Programme)
- Partners: Ministry of Defence of Mongolia, Environmental Information Centre, Institut of Geoecology
- Responsibility: Slovak Environment Agency

Mongolian – Slovak project
Establish the GeoDatabase on ecological health of the military sites

The main objectives of the project:

- 1. Introduce with the international practice on developing methodology of investigation and establishing Geo-database for identifying the ecological situation in/around military sites:**
 - Study tour of Mongolian specialists to Slovakia to introduce with methodology of conducting investigation in/around military sites and establishment of Geo-database.
 - Literature review of research methods on investigating contamination by CBRN agents.
 - Introduce with methods of laboratory analysis to identify level of contamination by CBRN agents.
- 2. Design and implement Geo-database on ecological status of military sites, especially the by Soviet army during 1970-1990:**
 - Develop data list, logical design and physical design of Geo-database.
 - Test Geo-database prototype.
 - Data entry and quality assurance.
- 3. Diagnose and assess the level of contamination and degradation of military sites:**
 - Implement field training among specialists of Mongolian Army Force to conduct soil and water sampling of soil and water resources, and assess contamination rate.
 - Collect soil and water samples from post Soviet and current military sites in accordance to the design.
 - Conduct laboratory analysis for soil and water samples.
 - Assess the level of contamination and land degradation in/around military sites.



Establish the Geo-Database on ecological health of the military sites

Introduce with the international practice on developing methodology of investigation and establishing Geo-database for identifying the ecological situation in/around military sites

- Study tour of Mongolian specialists in Slovakia to introduce with methodology of conducting investigation in/around military sites and establishment of Geo-database
- Literature review of research methods on investigating contamination
- Introduce with methods of laboratory analysis to identify level of contamination



Establish the Geo-Database on ecological health of the military sites

Design and implement GeoDatabase on ecological status of military sites, especially those which are used by Soviet army during 1970 – 1990

- Develop data list, logical and physical design of GeoDatabase
- Test the GeoDatabase
- Data entry and quality assurance

Экологийн доройтол, бохирдлын мэдээллийн сан

Home page Contaminated sites - Contaminant data - Risk assessment - GIS data Report - Data entry

Number of samples exceeded the limit value, by aimag

Please select aimag

Bayankhongor

Bayan Olgiit
Bulgan
Darkhan Uul
Dornod
Dornogovi
Dundgovi
Govi Altai
Khovd
Khovsgol
Omnogovi
Ovorkhangai
Selenge
Sukhbaatar
Tov
Uvsnobatar
Uvs
Back

Aimag name: Bayankhongor

Number of soil contaminants exceeded limit values, by aimag

Please select soil contaminant

Arsenic
 Copper
 Lead
 Mercury
 Nickel
 Sulphate

Please select water contaminant

Copper
 Dissolved oxygen
 Sulphate
 Temperature

Number of soil contaminants exceeded limit values, by aimag

Nº	Aimag name	Site name	Contaminant/indicator name in English	Number of exceed standard limit value
1	Bayankhongor	Алутга, Анаг толгой, Атгаг ус, Ар уснуу, Баян хагар, Баян аз, Бөөргийн аймаг эх, Буйлсан, Булаг, Давхар хар, Дугуй цагаан, Загийн ам, Майхан зурган, Мөн хар урдан, Нугаар талын буяг, Өвөрчулуут, Өндөр ялаан, Сайрны өвдөр худаг, Сайрны	Arsenic	100

Geo-Database on ecological health

Home page Contaminant data - Contaminated sites - Impact assessment - GIS data Data entry

Ground Coordinates - UTM48N
Latitude: 457711.00795118
Longitude: 4974945.8993804

Site information
Military site type: Уул уурхайн олборлолт
Military site name: Хэрээд

Дүншилсэн тухай	Аймаг нэр	Урсгал нэр	Газрын нэр	Амери мэдээллийн төрөл	Газрын нэр	Эмгэгчдийн нэр	Эмгэгчдийн нэр	Эмгэгчдийн нэр	Эмгэгчдийн нэр
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	Am	mg/kg	0.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	As	mg/kg	6.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	Cd	mg/kg	0.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	Cu	mg/kg	21.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	Hg	mg/kg	0.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	Pb	mg/kg	4.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	Zn	mg/kg	40.70000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	mg	mg/g	18.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	%	%	0.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	mg	mg/kg	0.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	As	mg/kg	8.00000
1000	Баянхонгор	Увсан	Уул	Амь	Газрын нэр	Уул уурхайн олборлолт	Cd	mg/kg	0.00000

Establish the Geo-Database on ecological health of the military sites

Diagnose and assess the level of contamination and degradation of military sites

- Implement field training among specialists of Mongolian Army Force to conduct soil and water sampling, visual analysis of soil and water resources, and assess contamination
- Collect soil and water samples from post Soviet and current military sites in accordance to the predefined sampling design
- Conduct laboratory analysis for soil and water samples
- Assess the level of contamination and land degradation in/around military sites
- Develop map of the level of contamination and land degradation in/around military sites



Establish the Geo-Database on ecological health of the military sites

Develop scientific justifications for decontamination and rehabilitation of degraded military sites

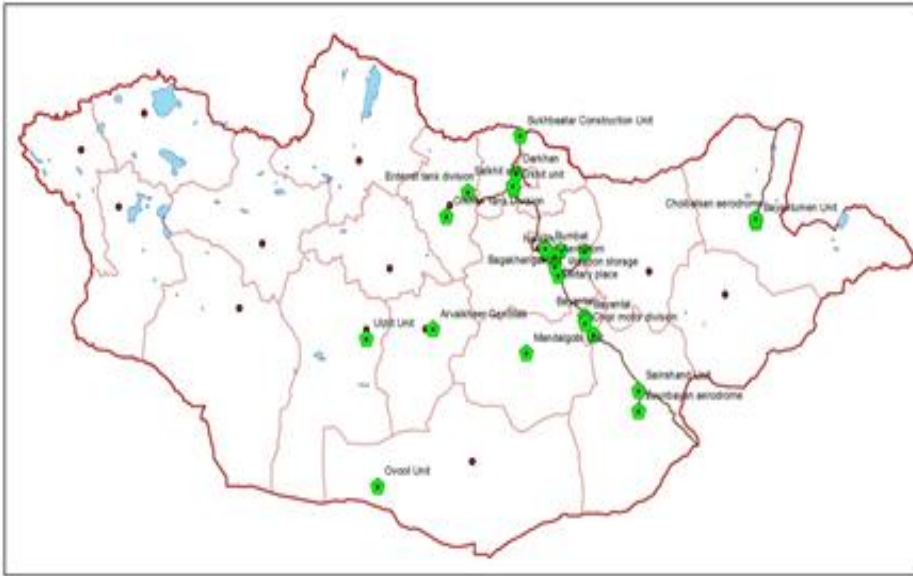
- Conduct study tour to introduce with innovative methods of decontamination of contaminants from soil and water
- Develop Management plan for decontamination and rehabilitation of degraded military sites



Soviet army in Mongolia

- Mongolia is one of the countries where the military activity was activated during post-WWII period. Unfortunately, little is known about the current ecological situation in areas where previously the military activities took place.
- According to the recent surveys, about 100,000 ha area has been directly affected by contamination, however the level of it and the main pollutants are still unrecognized.
- Approximately 500,000 people currently residing in and around those sites.
- 25 soviet units were located in Mongolia during 1970 – 1990 – 15 localities are currently used by Mongolian Armed Forces and 10 places have been already transferred to local authorities for civil society use.

Military sites in Mongolia



Location of main military units based in Mongolia during Soviet period (1970 – 1990)



The ruin of old heating plant in Bayantumen



Birds died in oil contaminated site



Artillery Shells (UXO) 122 mm Howitzer

GeoDatabase on ecological health of the military site

The screenshot shows a web browser window with the URL www.eic.mn/envmonitor/gis.php. The page title is "Geo-Database on ecological health". The navigation menu includes "Home page", "Contaminated sites", "Contaminant data", and "Risk assessment". On the left, there is a "Map Layers" panel with various categories such as "Sites, by polygon", "Water sampling points", "Soil sampling points", "Contaminating activity", "Military sites", "Agriculture sites", "Waste disposal sites", "Existed constructions", "Waste points", "Water sampling results", "Soil sampling results", "Validation Sites", "Classified image", "Feature", and "Road Network". The main map area shows a geographical map with several locations labeled, including "Mesgil", "Sulper", "Arkhangai", "Ovokhangai", and "Dundg". A blue arrow points from the map area to a detailed data table.

Site ID	Site Name	Site Type	Site Status	Site Address	Site Coordinates	Site Description
1
2
3
4
5
6
7
8
9
10

This table provides detailed information for a specific site, including its name, address, and coordinates. A blue arrow points from the map area to this table.

Site ID	Site Name	Site Type	Site Status	Site Address	Site Coordinates	Site Description
1



This screenshot shows the same web application interface as the first screenshot, but with an aerial view of a military site. The navigation menu includes "Home page", "Contaminated sites", "Contaminant data", "Risk assessment", "GIS data", "Report", and "Data entry". The page title is "Database on ecological health". The main map area shows an aerial view of a military site with several buildings and structures. A blue arrow points from the map area to a detailed data table.

Site ID	Site Name	Site Type	Site Status	Site Address	Site Coordinates	Site Description
1
2
3
4
5
6
7
8
9
10

www.eic.mn
www.eic.mn/envmonitor/

Bayantal, Google Maps

Mongolia – conclusion

- Mongolia has a waste territory and low population, which is primary factor of underdevelopment of the contamination issues in a country. However, recent research and the results of the current project point to critical situation in contamination. The preliminary investigation identifies that potential risk in currently contaminated sites to the public is high, and thus it is necessary to develop national strategy on contaminated site as well as implement remediation activities in those areas where the direct risk to population has already been defined.
- The former military sites in Mongolia experienced an active demolition, however, the proper management of these activities never been implemented, thus increased a risk of contaminant's discharge to deeper soil layers and possible to the underground aquifers. Unfortunately, there are no any surveys done in regards to assessment of the underground water contamination. So, it is suggested to implement more remarkable investigation and monitoring activities in critical areas to identify possible risks.

Soviet Army in Slovakia

Soviet Army
in in Slovakia (former Czechoslovakia)
1968 – 1992
355 military objects



Slovakia – former SA contaminated sites

- 78 potentially contaminated sites within 18 former Soviet Army areas were investigated
- 1 Airport + services area + fuel storage
- 1 Army training area – 260 km², included 18 part places (camps, shooting areas, garages, storages, farm etc.)
- 16 other military bases (caserne, garages, storages, shooting areas, etc.).
- Situated mainly in towns
- 15 sites were classified with very high risk



Slovakia – remediation technologies (Sliač, Vlkanová)

Groundwater remediation methods

- Pump and treat
- Pumping from wells and drains (4 drains deep cca 6 – 7 m, together cca 2 km long)
- Water was treated in 2 water treatment plants
- Water cleaned from contaminants was discharged back to groundwater through infiltration drainage



Soil remediation methods

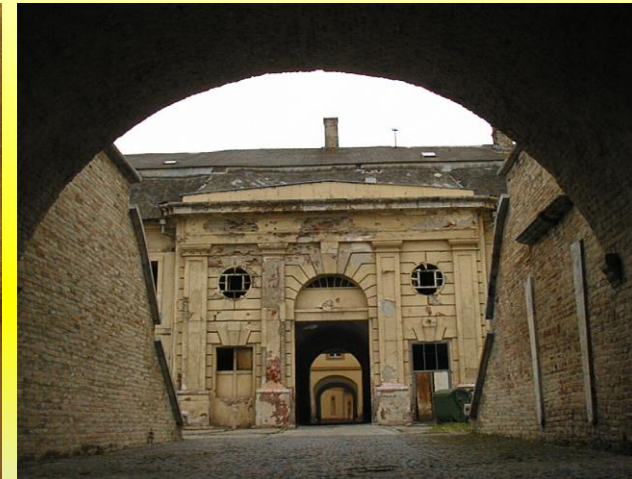
- Excavation and Biodegradation ex situ
- Biodegradation in situ
- Venting (soil gas pumping and treatment)
- Soil leaching



Remediation of Contaminated Sites Left by the Soviet Army

- Project duration: 2014 – 2015
- Budget allocation: cca 12,5 mil. €
- Budget source: Operational programme Environment
- State remediation program of contaminated sites (2010 – 2015)
- 6 localities
- Responsibility: Ministry of Defence of the Slovak Republic

Komárno – the former military site





THANKS FOR YOUR ATTENTION

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