



**Promoting green recovery and reconstruction in Ukraine
through science-policy interface and public participation:
Kakhovka Reservoir Sediments Assessment**

REPORT

March 2025

Final Substantive Report

Name of the Project	Promoting green recovery and reconstruction in Ukraine through science-policy interface and public participation: Kakhovka Reservoir Sediments Assessment
Name of implementation organization	UNEP
Total project cost	USD 413,968 with additional co-finance of USD 200,000 from USA and USD 361,350 from Japan
Implementation period	28 April 2024 – 1 March 2025
Implementing Partners	Government of the Czechia; Government of Japan; Government of the United States of America; State Environmental Inspectorate of Ukraine; Dekonta, Arnika, INPOLIT UA, ICSA NAAN UA; Nicole; Nicole Foundation; ALS Laboratory Prague, Ministry of Defense of Ukraine

1. Background

The ongoing armed conflict taking place in Ukraine is having widespread and long-term environmental consequences on the country, which may potentially extend to transboundary ecosystems. The scale of the impacts is to a large extent a function of:

- i. the country's dense industrial infrastructure;
- ii. the intensity and duration of combat, including the use of both conventional and advanced weaponry and modern military technologies; and
- iii. the varying environmental settings in which a large part of the armed combat is taking place including highly urbanized areas, high value agricultural lands, and in various sensitive ecosystems.

On 6 June 2023, the Nova Kakhovka hydroelectric dam on the Dnipro river, situated in Kherson Oblast, was breached with serious environmental, economic, and social consequences. Downstream communities were flooded, and the upstream reservoir depleted, leading to a destruction of ecosystems and associated services.

Upon request of the Government of Ukraine, UNEP undertook a rapid environmental assessment of the event (**United Nations Environment Programme (2023) Rapid Environmental Assessment o Kakhovka Dam Breach. Ukraine, 2023. Nairobi, Kenya**), which also contributed information to the Post Disaster Needs Assessment undertaken by the UN system in Ukraine.

It is important to note that the entire study area is, and remains, the frontline of the war.

The assessment identified the following primary potential impacts:

Upstream Primary Impacts

- Hydrological & geomorphic impacts of the reservoir dewatering including sediment mobilization and impacts to regional groundwater
- Damage / destruction of natural / sensitive habitats, species and damage to protected areas
- Exposure to, and desiccation of, sediments, including exposure to and migration of potential legacy pollutants therein (e.g. contact, agricultural use, wind mobilization)
- Impacts from weapons of war including presence of mines, explosive ordnance & other munitions

Downstream Primary Impacts

- Sediment mobilization
- Mobilization of explosive ordnance (e.g. mines, unexploded ordnance & other munitions)
- Flooding hazardous (e.g. asbestos) & non-hazardous debris generation / mobilization
- Damage / destruction of natural / sensitive habitats, species, and damage to protected areas
- Environmental impacts from flooded facilities containing various hazardous and industrial materials likely resulting in oil, fertilizer and various chemical spills / releases.

As stated in the UNEP Rapid Environmental Assessment *“without reservation the assessment concludes that the Kakhovka dam breach is a far-reaching environmental disaster; the scale of which might not be clear for years or even decades to come”*.

The UNEP Rapid Environmental Assessment was conducted remotely due to short time available to immediately responding to the request by the Ukrainian Government and ongoing hostilities, limiting its ability to verify findings on the ground. As a result, ground-truthing remained essential to fully assess the extent of environmental damage.

This necessity is emphasized in both the UNEP report and the Post-Disaster Needs Assessment. Accordingly, this project was therefore designed to implement the recommendation for on-site verification, ensuring a more comprehensive understanding of the disaster's long-term environmental consequences focusing in particular on the upstream part and the recommendation to “Exposure to, and desiccation of, sediments, including exposure to and migration of potential legacy pollutants therein (e.g. contact, agricultural use, wind mobilization)”.

2. Status of Implementation

The objective and outcomes defined this project were achieved within the approved timeframe by the successful implementation of the following activities:

Activity 1. Assessment and remediation plans

Under this activity the project focused on assessing the health and environment risks related to the contamination in Kakhovka reservoir. The project has successfully achieved the project’s scope and went even beyond to enhance the effectiveness and adaptability of the project. This included reviewing existing data, designing effective sampling strategies for conflict zones, and engaging stakeholders. A comprehensive digital system for data management was established, and real-time warfighting data was

integrated into risk assessments. Samples were collected and analyzed to evaluate contamination levels and human health risks. Based on these findings, a Conceptual Site Model (CSM) was developed to inform targeted remediation actions and long-term mitigation strategies. These efforts culminated in a report outlining recommendations for environmental recovery and health protection.

Activity 1.1. Initial Assessment

Project Scope:

Review of UNEP's Assessment: Begin by thoroughly reviewing the existing data provided by UNEP on the identified facilities and pollution within the flood-affected area and evaluate the potential impacts of these hotspots on human health and the environment.

Methodology Selection for Conflict Conditions: Search and identify methodologies suitable for data collection in conflict-ridden zones. Determine the types of sampling and analysis equipment needed for various stakeholders, including informants, local farmers, and NGOs. *(options like the use of drones for soil and water sampling, especially in frontline areas where direct human access may be challenging).*

Status:

The project conducted a detailed desk study of available data and information on the Kakhovka Reservoir and the dam breach event. To support the analysis, an ArcGIS database was developed for the area of interest, integrating publicly available data from sources such as Ecodozor, social media, public registries, and satellite imagery, along with insights from multiple background reports.

Additionally, data on the chemical quality of sediments from various sources were analyzed, interpreted, and incorporated into the GIS system. This enabled the creation of detailed maps, made available through restricted web access, providing insights into historical land use, past environmental events, and potential contamination sources in sediments and surface water. These insights formed the foundation for defining sampling areas and structuring the sampling plan.

The acquired data, along with an evaluation of sediment and surface water quality, historical events, and structural integrity, informed the development of a robust sampling and analytical approach for Kakhovka sediments. This approach was reviewed and refined in consultation with a Scientific Advisory Board comprising experts from the NICOLE Foundation network, resulting in a non-biased, semi-binary statistical method for defining sampling areas, selecting sample collection points, and determining key analytes for sediment and water analysis.

The proposed sampling approach was further assessed by the field team, considering security challenges posed by the ongoing conflict, and was adjusted given the security situation and accessibility to sampling sites.

In addition to the project scope, several key actions were taken to enhance the effectiveness of this activity:

- To improve analytical capacity, the project evaluated Ukrainian laboratories for potential contracting, aiming to reduce reliance on external facilities.
- A comprehensive digital data management system was established.

- Negotiations were undertaken to integrate impact data from the Ecodozor¹ platform into the sample selection process, and real-time warfighting data from the Institute for the Study of War was incorporated into ArcGIS for dynamic risk assessment.
- A bespoke Conceptual Site Model (CSM) was developed to identify exposure pathways based on professional expertise and historical data.
- To address logistical challenges, customized shipping solutions were implemented, including three electronic refrigeration units to ensure sample integrity amidst shipping delays caused by war restrictions.

The results of this activity are included in the technical report titled “*Environmental Assessment of Sediments from the Nova Kakhovka Reservoir Dam Breach, March 2023*”, which is provided as an annex to this report for further reference.

Activity 1.2. Collaboration and Partnership Building

Project Scope:

Stakeholder Engagement: Engage with local NGOs, farmers, and other stakeholders to gather their inputs and concerns. Form partnerships with local and international organizations for collaborative efforts in data collection and assessment.

Sampling Campaign: Organize a systematic sampling campaign in collaboration with partners. Collect soil, water, and other relevant samples from the identified hotspots, ensuring the process aligns with international standards. Analyze the collected samples for pollutants and contaminants.

Status:

The project has collaborated with an international NGO, NICOLE; a local NGO, INPOLIT; and a semi-governmental institute: Institute of Climate-Smart Agriculture of the National Academy of Agricultural Sciences (ICSA – NAAS). In addition, key stakeholders from national and local governments, the local community, and other local NGOs were actively engaged in the process. ICSA-NAAS and INPOLIT played a crucial role in supporting soil and water sample collection and facilitating engagement with local authorities.

Field sampling and laboratory analysis were performed in the period from May 2024 to February 2025. Two sampling campaigns have been executed. The first field sampling campaign was performed by the team of ICSA in September 2024 and the second campaign was performed by one team from the Ministry of Defence and two teams from the State Environmental Inspectorate of Ukraine in January and February 2025.

Field sampling was coordinated with weekly planning, real-time adjustments, and provision of full logistical support and sampling equipment, ensuring that data collected adhered to high standards for quality and integrity. This systematic approach allowed the project to build a robust database for the risk assessment process and environmental remediation planning.

To ensure high-quality results, laboratory analysis of samples was conducted using internationally recognized analytical methods, which were carefully selected during the sampling strategy and risk assessment planning. The choice of analytes was based on an evaluation of the most probable

¹ Ecodozor is an online interactive platform, supported by UNEP to map, document and analyze the environmental impacts of war in Ukraine. Link: <https://ecodozor.org/>

pollutants, considering surrounding land use and the potential impacts of warfighting, including munitions and explosives of concern.

In addition to the project scope, following key actions were undertaken to strengthen the effectiveness and adaptability of this activity:

- An in-person training on sampling with practical sessions, was delivered in Kyiv for the personnel of the partners responsible for sampling.
- Training sessions were conducted for MoD personnel and Kyiv Horticultural Institute staff in field sampling and the use of sampling instrumentation, ensuring that local teams were equipped to carry out high-quality environmental data collection.
- Three full revisions to the field sampling plan and mapping were made to address security-based access restrictions, ensuring that the sampling campaign remained feasible despite ongoing conflict-related challenges.
- Given ICSA's inability to access more than five of the target sample locations, negotiations with INPOLIT NGO were initiated to secure access to Ministry of Defense (MoD) and State Environmental Inspectorate (SEI) teams for additional sampling.
- Oversight was provided for several additional rounds of sampling conducted by MoD and SEI teams, ensuring continuity and quality control throughout the fieldwork.
- A Czech laboratory was trained in the use of EQUIS® electronic data deliverables, improving their commercial skills and increasing their capacity to handle and deliver high-quality environmental data.

The results of this activity are included in the technical report titled “*Environmental Assessment of Sediments from the Nova Kakhovka Reservoir Dam Breach, March 2023*”, which is provided as an annex to this report for further reference.

Activity 1.3 Analysis & Results Interpretation

Project Scope:

Assessments: Evaluate the results from the sampling campaign to assess the severity and extent of pollution in each hotspot; and identify immediate health and environmental risks posed by each hotspot.

Remediation and Risk Mitigation Measures: Based on site assessment results, draft a comprehensive list of remediation actions for each hotspot. Design emergency containment measures to prevent further spread or exacerbation of pollutants. Propose long-term mitigation strategies to address underlying causes of pollution and prevent future occurrences. Collaborate with local authorities to integrate the findings, remediation measures, and monitoring programs into oblast (regional) recovery plans. Propose activities and initiatives that align with the broader goals of environmental conservation and human health protection in the affected area.

Status:

The Conceptual Site Model (CSM) and human health risk exposure modelling have been used to assess contamination risks and inform targeted remedial measures. The evaluation focused on compounds with observed concentrations that may pose a risk, guiding precautionary actions and necessary mitigation strategies.

The CSM provides a structured analysis of environmental and human health risks associated with the Kakhovka dam breach (June 6, 2023). It incorporates:

- The historical and current state of the river and dam,
- Industrial and agricultural activities upstream,
- Expected contaminants and their transport mechanisms,
- Post-breach environmental changes, and
- Potential physical, chemical, and biological impacts.

This assessment prioritizes key risk factors, supporting the development of prevention, restoration, mitigation, and adaptation measures. It serves as a basis for defining emergency containment strategies and long-term environmental monitoring programs.

A final report consolidating the results of field sampling, laboratory analysis, risk assessment, and data integration has been prepared. These findings align with the project’s objectives and provide evidence-based recommendations for incorporating risk mitigation into oblast recovery plans.

In addition to the project scope, several key activities were undertaken to further enhance the outcomes of this activity:

- A bespoke human health risk assessment model was developed, based on the most likely exposure pathways identified through the conceptual site model and supported by field and analytical results. The model revealed exceedances of screening and remediation levels, offering conclusions on potential health risks associated with contamination.
- Experts in crop science were engaged to evaluate potential food chain impacts. This expert input provided recommendations for remedial measures should the observed contamination levels warrant further action to protect agricultural production and human health.

The results of this activity are included in the technical report titled “*Environmental Assessment of Sediments from the Nova Kakhovka Reservoir Dam Breach, March 2023*”, which is provided as an annex to this report for further reference.

Activity 2. Public Consultations & Dialogues

Activity 2.1. Pre-Consultation Preparation

Project Scope:

Data Compilation: Organize all the findings and data gathered from Activity 1 into a comprehensive report, highlighting the key concerns and areas of focus. Include visuals like maps, graphs, and charts to help illustrate the pollution hotspots and their impacts.

Identification of Stakeholders: List down all the key stakeholders including local community representatives, NGOs, business leaders, and government authorities. Segment the stakeholders based on their relevance, influence, and interest in the recovery process. Prepare a set of guiding questions and discussion points based on the data from Activity 1, focusing on recovery and construction activities.

Status:

Building on the findings from Activity 1, key stakeholders for consultations were identified, and engagement efforts were initiated. Discussions with governmental officials were ongoing throughout the implementation of Activity 1, ensuring continuous dialogue and alignment on project objectives.

To facilitate informed decision-making and outreach, the project organized a field visit for the State Environmental Inspectorate and experts to Zaporizhzhia and Kryvyi Rih in Dnipropetrovsk Oblast and convened a roundtable of stakeholders.

During this visit, additional information and data from governmental officials on the contamination of the Kakhovka reservoir were collected. The roundtable was convened to discuss the sampling campaign, and plan for the consultation forum.

These consultations are critical for ensuring that the findings and recommendations from Activity 1 are effectively communicated and integrated into policy discussions, local decision-making, and future recovery plans.

Activity 2.2. Consultations

Project Scope:

Begin the consultation by presenting the findings from Activity 1. Highlight the areas that require immediate attention and the proposed methodologies for addressing them.

Feedback Collection: Allow stakeholders to voice their concerns, suggestions, and feedback based on the presented findings. Use tools like feedback forms or digital platforms to collect structured feedback.

Status:

Considering the security situation, and in coordination with local authorities, a consultation forum on the findings from Activity 1 was held in Kryvyi Rih on 28 November 2024. During the forum, the results from studies and sampling in the Kakhovka Reservoir were presented and discussed with participants, ensuring transparency and stakeholder engagement in evaluating environmental risks and proposed mitigation measures.

In addition to the forum, continuous consultations with authorities were conducted through site visits and meetings throughout the project. These engagements ensured that key findings were effectively communicated and that governmental and local stakeholders remained involved in the decision-making process. The forum proceeding is available for further information, as annex to this report.

Activity 2.3. Feedback & Proposals

Project Scope:

Compile all the feedback received during the consultations. Analyze the feedback to identify common themes, concerns, and proposed solutions. Merge the feedback with the findings from Activity 1 to create a holistic view of the situation and the way forward.

Drafting Proposals: Based on the feedback and the findings, draft actionable proposals for recovery and construction activities. Ensure the proposals align with the dual goals of economic development and green recovery. Design a roadmap for implementing the proposals, assigning roles, responsibilities, timelines, and required resources. Highlight the nature-based solutions and climate-friendly initiatives that will be prioritized.

Following the consultation forum in Kryvyi Rih on 28 November 2024, feedback, recommendations, and proposals were gathered from participants, including local authorities and experts. These inputs were further supplemented through direct consultations held during meetings and site visits throughout the project. The collected feedback was analyzed and incorporated into the final report on sampling analysis and recommendations. It is also documented in the Forum Proceeding attached this report as annex.

Risk-based measures have been developed with consideration for the extensive dimensions of the impacted area of the former Kakhovka reservoir, as well as the limited availability of equipment and financial resources following the conflict. The focus is on implementing robust, cost-effective and practically feasible solutions that are driven by risk assessments. In addition, nature-based solutions have been incorporated into this approach.

3. Collaboration and Cofinancing

Given the importance and relevance of this initiative, UNEP also secured co-financing from the governments of Japan and the United States, enabling the project to expand beyond its original scope. Additionally, in-kind and cash contributions totaling USD 286,500 were provided by NICOLE's network. Key contributors from the network included ALS Laboratory (Prague), AquaTerraSana (France), DND Biotech (Italy), Earthsoft (USA), ERM Foundation (UK), Esri ArcGIS (Belgium), Liljemark Consultancy (Sweden), Nicole Foundation (Belgium), Tauw Foundation (Netherlands), and Tauw (Netherlands).

Collaboration among various organizations played a crucial role in the successful delivery of this project. UNEP worked closely with NICOLE, ICSA-NAAS, INPOLIT, the State Environmental Inspectorate, the Ministry of Environmental Protection and Natural Resources, the Ministry of Defense, Dekonta – Czechia, Arnika and other organizations listed below for their in-kind and in-cash contribution. This partnership enhanced the project's effectiveness, enabling it to exceed its original scope and deliver more than initially planned.

4. Outreach and Visibility on the project

Considering the importance of the project, UNEP ensured great visibility to the initiative and to the financial support of Czechia.

The project has been presented at various high-profile events, including a presentation at the Parliamentary hearing by the Environment Committee of the Verkhovna Rada, presentations at the OSCE Economic and Environmental Committee special session on Ukraine, briefing in Nairobi for UNEP's Member States, briefing in Kyiv for Missions and Embassies in Ukraine, and a presentation at the event on Environmental Consequences of War in New York organized by Ukraine and Finland.

The project also gained high-level visibility through briefings delivered by UNEP's Executive Director, the Director of the Ecosystem Branch, the Head of the Disasters and Conflict Branch, and other senior UNEP leaders. Last but not least the project results were presented during the high-level visit of the delegation led by Minister of Environment of Czechia in Nairobi on 6 February 2025

The project has undertaken extensive outreach on the environmental and health risks of contamination in the desiccated Kakhovka reservoir through roundtables, meetings, forums, and training sessions with key stakeholders.

The knowledge products developed under this initiative serve as lasting tools for advocacy and awareness, ensuring the project's findings remain accessible and influential over time.

5. Unique Project Challenges

Throughout the project, a variety of challenges were encountered that required adaptation of our approach and in some cases modification of the scope. Key challenges included:

- A. **Active war fighting within and adjacent to the study area.** The subject study area is right at the contact line of armed conflict. This created significant additional risks to sampling personnel, required significant planning, work clearance actions with multiple levels of government and military officials, and scientific trade-offs (e.g. inability to access “ideal” sampling locations). In addition, the use of new drone warfare techniques created unique “signal” issues (e.g. not using any digital / analog equipment that produces two-way transmissions that can be used to hone-in on the sampling teams for drone / other armed attacks). The presence of mines and explosive ordnance in work areas, etc. required additional clearance and care in the field. Air raids were a constant challenge as well - for example in 2024 the study area was under air alerts as follows:
 - i. Kherson - 1331 air alert/1465 hours
 - ii. Dnipropetrovsk - 2039 air alerts/1933 hours
 - iii. Zaporizhzhya - 1958 air alerts/2003 hours

- B. **Limited National Technical Capacity.** There were a wide range of technical limitations related to the collection and analysis of environmental samples according to international best practice / standards. This included limited experience using field environmental investigation tools & instrumentation; insufficient analytical chemistry capacity to analyze samples according to the required international standards; and inexperience with sampling related personnel protective equipment and decontamination procedures. To address these limitations the origin plan was to conduct training of our partners remotely using digital technology including live video meetings and digital offline asynchronous training tools. It became clear in discussions leading up to the training that in-person training was imperative given the subject matter covered (physical collection of sediment & water samples, hands in use of field screening instrumentation, use of digital data collection tools, etc).

- C. **Limited availability of transportation & shipping services due to active war.** The ability to transport equipment, personnel, and samples required extensive modifications to standard operational approaches. This required extensive and costly (time and money) alternative approaches to be developed including bespoke shipping approaches for sampling, the use of UN diplomatic shipping process, etc.

- D. **Constraints related to compliance with unique local regulations.** We encountered a unique issue related to the transnational transportation of environmental samples. There is a regulation that prohibits the transportation of soil/ water samples outside of Ukraine except for scientific purposes. This regulation is not entirely clear or well understood (e.g. by customs officials) so there were delays during shipping related to this issue. The solution required a letter be prepared by UNEP that cited the relevant law and the reasons behind the sampling. There were other customs issues related to this (new forms identified that required completion). This had a negative impact on shipping times for the test run of 5 samples (extended shipping by almost 2 weeks over the optimal scenario).

6. Summary Table of Activities Completed

Table 1. Summary of Activities Completed

Project Scope	Project Progress	Additional Initiatives	Document Link(s)
Activity 1: Assessment and Remediation Plans			
<p>1.1 Initial Assessment</p> <p><u>Review of UNEP’s Assessment:</u> Begin by thoroughly reviewing the existing data provided by UNEP on the identified facilities and pollution within the flood-affected area and evaluate the potential impacts of these hotspots on human health and the environment.</p> <p><u>Methodology Selection for Conflict Conditions:</u> Search and identify methodologies suitable for data collection in conflict-ridden zones. Determine the types of sampling and analysis equipment needed for various stakeholders, including informants, local farmers, and NGOs. (options like the use of drones for soil and water sampling, especially in frontline areas where direct human access may be challenging).</p>	<ul style="list-style-type: none"> • Historic use and event evaluation conducted. Included analysis of historic documents and confidential work by Prosecutor General’s office • Identification and prioritization of sampling areas • Identification of analytical parameters, methodologies & selection of laboratory partner (ALS Prague) • Convened global expert panel (EU, US, Australia) for the development of the sampling and analysis plan, related environmental health & safety and quality planning • Procurement and provision of field and sampling equipment and shipment to the selected fieldwork partner in Ukraine • Planning and preparation of the sampling campaign & logistics coordination 	<ul style="list-style-type: none"> • Evaluated capacity of UA analytical laboratories for possible contracting • Created comprehensive digital environment to include Spatial (ArcGIS); Environmental Data Management (EQUIS®); Analytical Lab Electronic Data Deliverables; field digital sample app (Collect®); Web Based Digital File Storage. System is scalable to handle all environmental data collected by UNEP / Partners in Ukraine • Negotiations with Ecodozor to integrate impact data into sample selection process, negotiated with Institute for the Study of War to integrate real time war fighting data, ArcGIS layers added for both sources • Given the complexity of the study area – developed a bespoke conceptual site model to identify potential exposure pathways based on professional experience, historical information, and analogous circumstances. • Developed bespoke shipping options, including provision of three electronic field refrigeration units to address unacceptably long shipping time through national carrier due to war restrictions 	<p>NICOLE Report <i>Environmental Assessment of Sediments from the Nova Kakhovka Reservoir Dam Breach, March 2023</i></p>
<p>1.2 Collaboration & Partnership Building</p>	<ul style="list-style-type: none"> • Selection of local Ukrainian Institute partner (ICSA NAAN) and establishment of their training needs 	<ul style="list-style-type: none"> • Converted planned remote (video) training event to an in-person event conducted in Kyiv 	<p>NICOLE Report <i>Environmental Assessment of Sediments</i></p>

<p><u>Stakeholder Engagement</u>: Engage with local NGOs, farmers, and other stakeholders to gather their inputs and concerns. Form partnerships with local and international organizations for collaborative efforts in data collection and assessment.</p> <p><u>Sampling Campaign</u>: Organize a systematic sampling campaign in collaboration with partners. Collect soil, water, and other relevant samples from the identified hotspots, ensuring the process aligns with international standards. Analyze the collected samples for pollutants and contaminants.</p>	<ul style="list-style-type: none"> • Oversight and coordination with ICSA included weekly planning of the sampling campaign, daily support for the field sampling teams. Daily support for the field teams consisted of real time sampling location adjustments, standby field team support, analytical lab coordination, integration of both field and laboratory data into the project database and quality control of field activities and analytical results • Laboratory analysis of samples using internationally recognized analytical methods selected during sampling strategy and risk assessment planning. Selected analytes based on evaluation of most probable pollutants based on surrounding land use and potential impacts from warfighting (including munitions and explosives of concern) 	<ul style="list-style-type: none"> • Three full revisions to the field sampling plan & mapping to address security-based access restrictions • Given ICSA inability to access more than 5 of the target sample locations, partner negotiations with INPOLIT UA NGO to access Ministry of Defence (MoD) & State Environmental Inspectorate (SEI) teams for sampling • Training of MoD personnel in field sampling & instrumentation use • Training of personnel from Kyiv Horticultural Institute in field sampling & instrumentation • Oversight of several additional rounds of sampling conducted by MoD & SEI teams • Additional project expenses incurred for MoD & SEI field teams (travel, accommodations, etc.) • Trained Czech Lab in use of Equis® electronic data deliverables thereby increasing their commercial skills 	<p><i>from the Nova Kakhovka Reservoir Dam Breach, March 2023</i></p>
<p>1.3 Analysis & Results Interpretation</p> <p><u>Assessments</u>: Evaluate the results from the sampling campaign to assess the severity and extent of pollution in each hotspot; and identify immediate health and environmental risks posed by each hotspot.</p> <p><u>Remediation and Risk Mitigation Measures</u>: Based on site assessments, draft remediation actions, emergency containment measures, and long-term strategies to address pollution causes. Collaborate with local authorities to integrate findings into regional recovery</p>	<ul style="list-style-type: none"> • The CSM and human health risk exposure modelling have been used as input to develop precautionary and, where required, conceptual remedial measures to take based on evaluation of compounds with observed concentrations that may pose a risk based on the human health risk assessment • A final report combining all these recommendations has been produced together with a description of the results of all other activities, such as field sampling and analysis, risk assessment evaluation, and data management information. 	<ul style="list-style-type: none"> • Developed a bespoke human health risk assessment model based on the most likely exposure pathways identified by the conceptual site model and field and analytical results. The Risk Assessment model outcome shows exceedance of screening and remediation levels and provides conclusions on potential health risks • Engaged experts in crop science to evaluate possible food chain impacts and remedial measures if observed conditions warranted action 	<p>NICOLE Report <i>Environmental Assessment of Sediments from the Nova Kakhovka Reservoir Dam Breach, March 2023</i></p>

plans, ensuring environmental and health protection.			
Activity 2: Public Consultations & Dialogues			
<p>2.1 Pre-Consultation Preparation</p> <p><u>Data Compilation:</u> Organize all the findings and data gathered from Activity 1 into a comprehensive report, highlighting the key concerns and areas of focus. Include visuals like maps, graphs, and charts to help illustrate the pollution hotspots and their impacts.</p> <p><u>Identification of Stakeholders:</u> List down all the key stakeholders including local community representatives, NGOs, business leaders, and government authorities. Segment the stakeholders based on their relevance, influence, and interest in the recovery process. Prepare a set of guiding questions and discussion points based on the data from Activity 1, focusing on recovery and construction activities.</p>	<p>Findings and information from the activity 1 are compiled and the key stakeholders for consultations are identified. Consultation and discussions with the governmental officials continued even during the implementation of the activity 1. The project facilitated a visit of the State Environmental Inspectorate and experts to Zaporizhzhia and Kryvyi Rih of Dnipropetrovsk Oblasts, to gather information but also to discuss the modality of consultation an outreach on the findings from Activity 1.</p>	<p>In addition to the data and information from Activity 1, the team has also actively engaged with relevant authorities and collected additional data and information.</p>	
<p>2.2 Consultations</p> <p>Begin the consultation by presenting the findings from Activity 1. Highlight the areas that require immediate attention and the proposed methodologies for addressing them.</p> <p><u>Feedback Collection:</u> Allow stakeholders to voice their concerns, suggestions, and feedback based on the presented findings. Use tools like feedback forms or digital platforms to collect structured feedback.</p>	<p>Considering the security situation and after discussions and coordination with the local authorities, a forum for consultation on the findings from Aactivity 1 was organized in Kryvyi Rih, on 28 November 2024. Findings from studies and sampling in Kakhovka reservoir were presented in the forum, and the results were consulted with the participants. Consultation with authorities were also made during meetings and visits to the sites, throughout the life of the project.</p>		<p>Forum Proceedings: Consequences of the destruction of Kakhovka HPP and The Green Recovery of Ukraine</p>

<p>2.3 Feedback & Proposals</p> <p>Compile all the feedback received during the consultations. Analyze the feedback to identify common themes, concerns, and proposed solutions. Merge the feedback with the findings from Activity 1 to create a holistic view of the situation and the way forward.</p> <p><u>Drafting Proposals:</u> Based on the feedback and the findings, draft actionable proposals for recovery and construction activities. Ensure the proposals align with the dual goals of economic development and green recovery. Design a roadmap for implementing the proposals, assigning roles, responsibilities, timelines, and required resources. Highlight the nature-based solutions and climate-friendly initiatives that will be prioritized.</p>	<p>Feedback, recommendations and proposals were gathered from the forum, but also from direct consultation with different officials from the local authorities, and experts.</p>		<p>Forum Proceedings: Consequences of the destruction of Kakhovka HPP and The Green Recovery of Ukraine</p>

List of Annexes:

1. Original Project proposal
2. Environmental Assessment of Sediments from the Nova Kakhovka Reservoir Dam Breach, March 2023
3. Forum Proceeding: Consequences of the destruction of Kakhovka HPP and The Green Recovery of Ukraine
4. Financial Report