



## REQUEST FOR PROPOSAL (RFP)

NAME & ADDRESS OF FIRM	DATE: August 27, 2019
	REFERENCE: <b>Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia</b>

Dear Sir / Madam:

We kindly request you to submit your Proposal for **Baseline survey on knowledge, Awareness and Practice (KAP) of potential beneficiaries on local climate risk management options (including use and impact) and baseline study of Impact evaluation for structural measure.**

Please be guided by the form attached hereto as Annex 2, in preparing your Proposal.  
Proposals may be submitted on or before Monday, September 16, 2019 to the address below:

**United Nations Development Programme  
9, Eristavi Street, Tbilisi, Georgia - UN House 1st floor**

**Box name:** Baseline survey

Your Proposal must be expressed in **English**, and valid for a minimum period of **90 days**

In the course of preparing your Proposal, it shall remain your responsibility to ensure that it reaches the address above on or before the deadline. Proposals that are received by UNDP after the deadline indicated above, for whatever reason, shall not be considered for evaluation. If you are submitting your Proposal by email, kindly ensure that they are signed and in the .pdf format, and free from any virus or corrupted files.

Services proposed shall be reviewed and evaluated based on completeness and compliance of the Proposal and responsiveness with the requirements of the RFP and all other annexes providing details of UNDP requirements.

The Proposal that complies with all of the requirements, meets all the evaluation criteria and offers the best value for money shall be selected and awarded the contract. Any offer that does not meet the requirements shall be rejected.

Any discrepancy between the unit price and the total price shall be re-computed by UNDP, and the unit price shall prevail and the total price shall be corrected. If the Service Provider does not accept the final price based on UNDP's re-computation and correction of errors, its Proposal will be rejected.

No price variation due to escalation, inflation, fluctuation in exchange rates, or any other market factors

shall be accepted by UNDP after it has received the Proposal. At the time of Award of Contract or Purchase Order, UNDP reserves the right to vary (increase or decrease) the quantity of services and/or goods, by up to a maximum twenty five per cent (25%) of the total offer, without any change in the unit price or other terms and conditions.

Any Contract or Purchase Order that will be issued as a result of this RFP shall be subject to the General Terms and Conditions attached hereto. The mere act of submission of a Proposal implies that the Service Provider accepts without question the General Terms and Conditions of UNDP, herein attached as Annex 3.

Please be advised that UNDP is not bound to accept any Proposal, nor award a contract or Purchase Order, nor be responsible for any costs associated with a Service Providers preparation and submission of a Proposal, regardless of the outcome or the manner of conducting the selection process.

UNDP's vendor protest procedure is intended to afford an opportunity to appeal for persons or firms not awarded a Purchase Order or Contract in a competitive procurement process. In the event that you believe you have not been fairly treated, you can find detailed information about vendor protest procedures in the following link:

<http://www.undp.org/content/undp/en/home/operations/procurement/protestandsanctions/>

UNDP encourages every prospective Service Provider to prevent and avoid conflicts of interest, by disclosing to UNDP if you, or any of your affiliates or personnel, were involved in the preparation of the requirements, design, cost estimates, and other information used in this RFP.

UNDP implements a zero tolerance on fraud and other proscribed practices, and is committed to preventing, identifying and addressing all such acts and practices against UNDP, as well as third parties involved in UNDP activities. UNDP expects its Service Providers to adhere to the UN Supplier Code of Conduct found in this link : [http://www.un.org/depts/ptd/pdf/conduct\\_english.pdf](http://www.un.org/depts/ptd/pdf/conduct_english.pdf)

Thank you and we look forward to receiving your Proposal.

Sincerely yours,

*Ketevan Skhireli*  
Project Coordinator



## Description of Requirements

Context of the Requirement	<b>Project “Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia”</b>				
Implementing Partner of UNDP	Ministry of Environment Protection and Agriculture of Georgia (MoEPA)				
Brief Description of the Required Services <sup>1</sup>	<b>Baseline survey on knowledge, Awareness and Perception (KAP) of potential beneficiaries on local climate risk management options (including use and impact) and baseline study of Impact evaluation for structural measure.</b>				
List and Description of Expected Outputs to be Delivered	<p><b>1. Updated survey design</b> including (month 1):</p> <p>1.1. <b>Finalised instruments</b> adapted to after piloting and consultations with the UNDP.</p> <p>1.2. <b>Samples approach and frame</b> - outline of the sampling design showing its attributes (age, gender, place of residence, social status and others.)</p> <p>1.3. <b>Evaluation matrix</b></p> <p>1.4. <b>Detailed timeline</b> – defining details for each step of survey.</p> <p><b>2. Technical Report</b> compliant with the requirements as detailed above (month 2);</p> <p><b>3. Database of the survey data</b> processed by means of the relevant software (month 3).</p> <p><b>4. Draft and Final survey reports (two reports) in both Georgian and English Languages– one for KAP and one for Impact Evaluation</b> containing interpretation of quantitative survey data and graphical presentations (charts, tables and others as necessary per consultations with UNDP) of the data in Georgian and in English languages. (December 19)</p>				
Person to Supervise the Work/Performance of the Service Provider	<i>Direct supervision by Project M&amp;E Associate and overall supervision by Project Coordinator</i>				
Frequency of Reporting	N/A				
Progress Reporting Requirements	N/A				
Location of work	Tbilisi and 10 municipalities of Georgia				
Expected duration of work	2,5 months				
Target start date	October 1, 2019				
Latest completion date	December 19, 2019				
Travels Expected	<b>Destination/s</b>	<b>Estimated Duration</b>	<b>Brief Description of Purpose of the Travel</b>	<b>Target Date/s</b>	

<sup>1</sup> A detailed TOR may be attached if the information listed in this Annex is not sufficient to fully describe the nature of the work and other details of the requirements.

	10 municipalities of Georgia	Approximately two weeks	Conduct face to face interviews	From mid-October
Special Security Requirements	N/A			
Facilities to be Provided by UNDP (i.e., must be excluded from Price Proposal)	None			
Implementation Schedule indicating breakdown and timing of activities/sub-activities	<input checked="" type="checkbox"/> Required <input type="checkbox"/> Not Required			
Names and curriculum vitae of individuals who will be involved in completing the services	<input checked="" type="checkbox"/> Required <input type="checkbox"/> Not Required			
Currency of Proposal	<input checked="" type="checkbox"/> United States Dollars <b>For local contractors, the payment will be made in GEL. UN exchange rate shall be applicable to any necessary currency conversions.</b>			
Value Added Tax on Price Proposal <sup>2</sup>	<input checked="" type="checkbox"/> must be exclusive of VAT and other applicable indirect taxes			
Validity Period of Proposals (Counting for the last day of submission of quotes)	<input checked="" type="checkbox"/> 90 days  In exceptional circumstances, UNDP may request the Proposer to extend the validity of the Proposal beyond what has been initially indicated in this RFP. The Proposal shall then confirm the extension in writing, without any modification whatsoever on the Proposal.			
Partial Quotes	<input checked="" type="checkbox"/> Not permitted			
Payment Terms <sup>3</sup>	Outputs	Percentage	Timing	Condition for Payment Release
	1) Updated survey design	25%	End October	Within thirty (30) days from the date of meeting the following conditions: a) UNDP's written acceptance (i.e., not mere receipt) of the quality of the outputs; and
	2) Technical Report and 3) survey database	25%	End November	
	4) Final survey reports	50%	Mid December	

<sup>2</sup> VAT exemption status varies from one country to another. Pls. check whatever is applicable to the UNDP CO/BU requiring the service.

<sup>3</sup> UNDP preference is not to pay any amount in advance upon signing of contract. If the Service Provider strictly requires payment in advance, it will be limited only up to 20% of the total price quoted. For any higher percentage, or any amount advanced exceeding \$30,000, UNDP shall require the Service Provider to submit a bank guarantee or bank cheque payable to UNDP, in the same amount as the payment advanced by UNDP to the Service Provider.



				b) Receipt of invoice from the Service Provider.
Person(s) to review/inspect/ approve outputs/completed services and authorize the disbursement of payment	<i>Direct supervision by Project M&amp;E Associate and overall supervision by Project Coordinator</i>			
Type of Contract to be Signed	<input checked="" type="checkbox"/> Contract for Professional Services			
Criteria for Contract Award	<input type="checkbox"/> Lowest Price Quote among technically responsive offers <input checked="" type="checkbox"/> Highest Combined Score (based on the 70% technical offer and 30% price weight distribution) <input checked="" type="checkbox"/> Full acceptance of the UNDP Contract General Terms and Conditions (GTC). This is a mandatory criteria and cannot be deleted regardless of the nature of services required. Non acceptance of the GTC may be grounds for the rejection of the Proposal.			
Criteria for the Assessment of Proposal	<p><b><u>Technical Proposal (70%)</u></b></p> <input checked="" type="checkbox"/> Expertise of the Firm 20% <input checked="" type="checkbox"/> Methodology, Its Appropriateness to the Condition and Timeliness of the Implementation Plan 40% <input checked="" type="checkbox"/> Management Structure and Qualification of Key Personnel 40%  <p><b><u>Financial Proposal (30%)</u></b></p> <p>To be computed as a ratio of the Proposal's offer to the lowest price among the proposals received by UNDP.</p>			
UNDP will award the contract to:	<input checked="" type="checkbox"/> One and only one Service Provider			
Annexes to this RFP <sup>4</sup>	<input checked="" type="checkbox"/> Form for Submission of Proposal (Annex 2) <input checked="" type="checkbox"/> General Terms and Conditions / Special Conditions (Annex 3) <sup>5</sup> <input checked="" type="checkbox"/> Technical Evaluation Criteria (Annex #4) <input checked="" type="checkbox"/> Detailed TOR Annex 5 with Annex #a Design document; Annex #b Cost benefit Analysis report			
Contact Person for Inquiries (Written inquiries only) <sup>6</sup>	<p><i>Dariko Bakhturidze</i>  M&amp;E Associate  <b><i>Dariko.bakhturidze@undp.org</i></b>  Any delay in UNDP's response shall be not used as a reason for extending the deadline for submission, unless UNDP determines that such an extension is necessary and communicates a new deadline to the Proposers.</p>			

<sup>4</sup> Where the information is available in the web, a URL for the information may simply be provided.

<sup>5</sup> Service Providers are alerted that non-acceptance of the terms of the General Terms and Conditions (GTC) may be grounds for disqualification from this procurement process.

<sup>6</sup> This contact person and address is officially designated by UNDP. If inquiries are sent to other person/s or address/es, even if they are UNDP staff, UNDP shall have no obligation to respond nor can UNDP confirm that the query was received.

Other Information <i>[p/s. specify]</i>	NA
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FORM FOR SUBMITTING SERVICE PROVIDER'S PROPOSAL<sup>7</sup>

*(This Form must be submitted only using the Service Provider's Official Letterhead/Stationery<sup>8</sup>)*

[insert: Location].

[insert: Date]

To: [insert: Name and Address of UNDP focal point]

Dear Sir/Madam:

We, the undersigned, hereby offer to render the following services to UNDP in conformity with the requirements defined in the RFP dated [specify date] , and all of its attachments, as well as the provisions of the UNDP General Contract Terms and Conditions :

**A. Qualifications of the Service Provider**

*The Service Provider must describe and explain how and why they are the best entity that can deliver the requirements of UNDP. The list of documents to be submitted:*

- a) Profile – describing the nature of business, field of expertise;
- b) Business Licenses – Registration Papers, Tax Payment Certification, etc .
- c) Track Record – list of clients for similar services as those required by UNDP, indicating description of contract scope, contract duration, contract value, contact references **(minimum requirements)**;
- d) Recommendation Letters/Statements of Satisfactory Performance from at least 2 clients conforming that bidder successfully completed assignment implemented in Georgia **(minimum Requirement)**
- e) Recommendation Letters/ Statements of Satisfactory Performance from international organizations within past 5 years will be an asset;
- f) Financial turnover-Bank letter certifying financial turn over minimum USD 80,000 (per year) during the last 2 years **(minimum requirement)**.
- g) Written Self-Declaration that the company is not in the UN Security Council 1267/1989 List, UN Procurement Division List or Other UN Ineligibility List.
- h) The list of at least 3 survey report with summery description of survey topic, survey scope and used methodology, which will proof that company has:
  - Institutional capacity of large-scale data analysis and experience of using inferential statistical analysis tools. (minimum requirement
  - Experience in doing agriculture surveys **(Minimum requirement)**
  - Experience in using geo spatial data analysis tools and/or experience in doing agriculture surveys for international organization **(an asset)**

**B. Proposed Methodology for the Completion of Services**

<sup>7</sup> This serves as a guide to the Service Provider in preparing the Proposal.

<sup>8</sup> Official Letterhead/Stationery must indicate contact details – addresses, email, phone and fax numbers – for verification purposes

*The Service Provider must describe how it will address/deliver the demands of the RFP; providing a detailed description of the essential performance characteristics and timeline, reporting conditions and quality assurance mechanisms that will be put in place, while demonstrating that the proposed methodology will be appropriate to the local conditions and context of the work and will follow the requirements defined as per ToR.*

*The Proposer should explain their understanding of the objectives of the assignment, approach to the services, methodology for carrying out the activities and obtaining the expected output, and the degree of details of such output. Proposer should highlight the problems being addressed and their importance and explain the technical approach you would adopt to address them.*

*Proposer should also explain the methodologies proposed to adopt and highlight the compatibility of those methodologies with the proposed approach. – **Company shall fully answer to the ToR requirement (as per Annex 5)***

### C. Qualifications of Key Personnel

*If required by the RFP, the Service Provider must provide:*

- a) Names and qualifications of the key personnel that will perform the services indicating who Project coordinator, expert etc. is as defined in ToR.*
- b) Written confirmation from each personnel that they are available for the entire duration of the contract*
- c) CVs demonstrating qualifications defined as per ToR must be submitted:*

- (1) **Project Coordinator***
- (2) **Thematic Expert***
- (3) **2 experts in sampling and questionnaire design***
- (4) **Statistical Analysis Expert***

*(Note: It is possible to combine several expert functions in one individual, provided that the candidate fully meets all needed qualifications).*

#### At minimum

##### a. **Project Coordinator:**

- At least Master's degree in social sciences or another field relevant to the project; **(minimum requirement)**
- At least 5-year experience of managing and coordinating of survey projects; **(minimum requirement)**
- Managing evaluation surveys (baseline, mid-line or final evaluations) will be an asset
- Knowledge of Georgian and English is a must. **(minimum requirement)**

##### b. **Key expert of thematic fields**

- At least 3-years' experience in Agricultural surveys **(minimum requirement)**
- Working experience in the field of DRR, DRM, MHRM will be an asset;
- Working experience in the field of agrometeorology will be an asset
- Knowledge of Georgian and English is a must. **(minimum requirement)**

##### c. **2 Key Experts in sampling and questionnaire design**

- At least 3-years' experience in sampling and questionnaire design **(minimum requirement)**

- Experience in sampling and questionnaire design in agricultural surveys will be an asset
- Knowledge of Georgian and English is a must. **(minimum requirement)**

**d. Key expert Statistical Analysis**

- At least 5 years of experience in statistical analysis of data;
- Experience in statistical analysis of data for agricultural surveys will be an asset.
- Knowledge of Georgian and English is a must. **(minimum requirement)**

**The other professional team must be proposed if deemed appropriate by the applicant to fulfill the assignment as spelled out in this RFP.**

**(Note: It is possible to combine several expert functions in one individual, provided that the candidate fully meets all needed qualifications).**

**D. Cost Breakdown per Deliverable\***

	<b>Deliverables</b> <i>[list them as referred to in the RFP]</i>	<b>Percentage of Total Price</b> <i>(Weight for payment)</i>	<b>Price</b> <i>(Lump Sum, All Inclusive)</i>
1	1) Updated survey design	25%	
2	2) Technical Report and 3) survey database	25%	
3	4) Final survey reports	50%	
	<b>Total</b>	100%	

*\*This shall be the basis of the payment tranches*

**E. Cost Breakdown by Cost Component [This is only an Example]:**

<b>Description of Activity</b>	<b>Remuneration per working day*</b>	<b>Total Period of Engagement (day*)</b>	<b>No. of Personnel</b>	<b>Total Rate</b>
<b>I. Personnel Services</b>				
1.1 Coordinator				
<b>2. Experts</b>				
2.1 Key Expert #1				
2.2 Key Expert #2				
2.3 Thematic Expert				
2.4 Statistical Analysis Expert				
2.5 other staff as required **				
subtotal				
<b>II Other Costs as required ***</b>				
3.1 Transportation				
3.2 Per diems				
3.3 Communication				
3.4 etc				
subtotal				
Total				

**Note:**

*\* UNDP strongly recommends organizations to use days as a primary unit of time when providing respective calculations under the Cost Breakdown under budget lines*

*\*\* Other subject-matter experts and/or personnel can be proposed if deemed appropriate by the applicant to fulfil the assignment as spelled out in this RFP.*

*\*\*\* Under Other Costs companies shall include detailed list of all costs associated with implementation of the tasks and deliverables, each cost shall be subjected and clearly calculated. Other related costs can be subject to UNDP review and approval;*

*[Name and Signature of the Service Provider's Authorized Person]*

*[Designation]*

*[Date]*

***General Terms and Conditions for Services*****1.0 LEGAL STATUS:**

The Contractor shall be considered as having the legal status of an independent contractor vis-à-vis the United Nations Development Programme (UNDP). The Contractor's personnel and sub-contractors shall not be considered in any respect as being the employees or agents of UNDP or the United Nations.

**2.0 SOURCE OF INSTRUCTIONS:**

The Contractor shall neither seek nor accept instructions from any authority external to UNDP in connection with the performance of its services under this Contract. The Contractor shall refrain from any action that may adversely affect UNDP or the United Nations and shall fulfill its commitments with the fullest regard to the interests of UNDP.

**3.0 CONTRACTOR'S RESPONSIBILITY FOR EMPLOYEES:**

The Contractor shall be responsible for the professional and technical competence of its employees and will select, for work under this Contract, reliable individuals who will perform effectively in the implementation of this Contract, respect the local customs, and conform to a high standard of moral and ethical conduct.

**4.0 ASSIGNMENT:**

The Contractor shall not assign, transfer, pledge or make other disposition of this Contract or any part thereof, or any of the Contractor's rights, claims or obligations under this Contract except with the prior written consent of UNDP.

**5.0 SUB-CONTRACTING:**

In the event the Contractor requires the services of sub-contractors, the Contractor shall obtain the prior written approval and clearance of UNDP for all sub-contractors. The approval of UNDP of a sub-contractor shall not relieve the Contractor of any of its obligations under this Contract. The terms of any sub-contract shall be subject to and conform to the provisions of this Contract.

**6.0 OFFICIALS NOT TO BENEFIT:**

The Contractor warrants that no official of UNDP or the United Nations has received or will be offered by the Contractor any direct or indirect benefit arising from this Contract or the award thereof. The Contractor agrees that breach of this provision is a breach of an essential term of this Contract.

**7.0 INDEMNIFICATION:**

The Contractor shall indemnify, hold and save harmless, and defend, at its own expense, UNDP, its officials, agents, servants and employees from and against all suits, claims, demands, and liability of any nature or kind, including their costs and expenses, arising out of acts or omissions of the Contractor, or the Contractor's employees, officers, agents or sub-contractors, in the performance of this Contract. This provision shall extend, inter alia, to claims and liability in the nature of workmen's compensation,

products liability and liability arising out of the use of patented inventions or devices, copyrighted material or other intellectual property by the Contractor, its employees, officers, agents, servants or sub-contractors. The obligations under this Article do not lapse upon termination of this Contract.

## **8.0 INSURANCE AND LIABILITIES TO THIRD PARTIES:**

- 8.1** The Contractor shall provide and thereafter maintain insurance against all risks in respect of its property and any equipment used for the execution of this Contract.
- 8.2** The Contractor shall provide and thereafter maintain all appropriate workmen's compensation insurance, or the equivalent, with respect to its employees to cover claims for personal injury or death in connection with this Contract.
- 8.3** The Contractor shall also provide and thereafter maintain liability insurance in an adequate amount to cover third party claims for death or bodily injury, or loss of or damage to property, arising from or in connection with the provision of services under this Contract or the operation of any vehicles, boats, airplanes or other equipment owned or leased by the Contractor or its agents, servants, employees or sub-contractors performing work or services in connection with this Contract.
- 8.4** Except for the workmen's compensation insurance, the insurance policies under this Article shall:
  - 8.4.1** Name UNDP as additional insured;
  - 8.4.2** Include a waiver of subrogation of the Contractor's rights to the insurance carrier against the UNDP;
  - 8.4.3** Provide that the UNDP shall receive thirty (30) days written notice from the insurers prior to any cancellation or change of coverage.
- 8.5** The Contractor shall, upon request, provide the UNDP with satisfactory evidence of the insurance required under this Article.

## **9.0 ENCUMBRANCES/LIENS:**

The Contractor shall not cause or permit any lien, attachment or other encumbrance by any person to be placed on file or to remain on file in any public office or on file with the UNDP against any monies due or to become due for any work done or materials furnished under this Contract, or by reason of any other claim or demand against the Contractor.

## **10.0 TITLE TO EQUIPMENT:**

Title to any equipment and supplies that may be furnished by UNDP shall rest with UNDP and any such equipment shall be returned to UNDP at the conclusion of this Contract or when no longer needed by the Contractor. Such equipment, when returned to UNDP, shall be in the same condition as when delivered to the Contractor, subject to normal wear and tear. The Contractor shall be liable to compensate UNDP for equipment determined to be damaged or degraded beyond normal wear and tear.

## **11.0 COPYRIGHT, PATENTS AND OTHER PROPRIETARY RIGHTS:**

- 11.1** Except as is otherwise expressly provided in writing in the Contract, the UNDP shall be entitled to all intellectual property and other proprietary rights including, but not limited to, patents, copyrights, and trademarks, with regard to products, processes, inventions, ideas, know-how, or documents and other materials which the Contractor has developed for the UNDP under the Contract and which bear a direct relation to or are produced or prepared or collected in consequence of, or during the course of, the performance of the Contract, and the Contractor



acknowledges and agrees that such products, documents and other materials constitute works made for hire for the UNDP.

- 11.2** To the extent that any such intellectual property or other proprietary rights consist of any intellectual property or other proprietary rights of the Contractor: (i) that pre-existed the performance by the Contractor of its obligations under the Contract, or (ii) that the Contractor may develop or acquire, or may have developed or acquired, independently of the performance of its obligations under the Contract, the UNDP does not and shall not claim any ownership interest thereto, and the Contractor grants to the UNDP a perpetual license to use such intellectual property or other proprietary right solely for the purposes of and in accordance with the requirements of the Contract.
- 11.3** At the request of the UNDP; the Contractor shall take all necessary steps, execute all necessary documents and generally assist in securing such proprietary rights and transferring or licensing them to the UNDP in compliance with the requirements of the applicable law and of the Contract.
- 11.4** Subject to the foregoing provisions, all maps, drawings, photographs, mosaics, plans, reports, estimates, recommendations, documents, and all other data compiled by or received by the Contractor under the Contract shall be the property of the UNDP, shall be made available for use or inspection by the UNDP at reasonable times and in reasonable places, shall be treated as confidential, and shall be delivered only to UNDP authorized officials on completion of work under the Contract.

## **12.0 USE OF NAME, EMBLEM OR OFFICIAL SEAL OF UNDP OR THE UNITED NATIONS:**

The Contractor shall not advertise or otherwise make public the fact that it is a Contractor with UNDP, nor shall the Contractor, in any manner whatsoever use the name, emblem or official seal of UNDP or THE United Nations, or any abbreviation of the name of UNDP or United Nations in connection with its business or otherwise.

## **13.0 CONFIDENTIAL NATURE OF DOCUMENTS AND INFORMATION:**

Information and data that is considered proprietary by either Party and that is delivered or disclosed by one Party ("Discloser") to the other Party ("Recipient") during the course of performance of the Contract, and that is designated as confidential ("Information"), shall be held in confidence by that Party and shall be handled as follows:

- 13.1** The recipient ("Recipient") of such information shall:
  - 13.1.1** use the same care and discretion to avoid disclosure, publication or dissemination of the Discloser's Information as it uses with its own similar information that it does not wish to disclose, publish or disseminate; and,
  - 13.1.2** use the Discloser's Information solely for the purpose for which it was disclosed.
- 13.2** Provided that the Recipient has a written agreement with the following persons or entities requiring them to treat the Information confidential in accordance with the Contract and this Article 13, the Recipient may disclose Information to:
  - 13.2.1** any other party with the Discloser's prior written consent; and,
  - 13.2.2** the Recipient's employees, officials, representatives and agents who have a need to know such Information for purposes of performing obligations under the Contract, and employees officials, representatives and agents of any legal entity that it controls

controls it, or with which it is under common control, who have a need to know such Information for purposes of performing obligations under the Contract, provided that, for these purposes a controlled legal entity means:

**13.2.2.1** a corporate entity in which the Party owns or otherwise controls, whether directly or indirectly, over fifty percent (50%) of voting shares thereof; or,

**13.2.2.2** any entity over which the Party exercises effective managerial control; or,

**13.2.2.3** for the UNDP, an affiliated Fund such as UNCDF, UNIFEM and UNV.

- 13.3** The Contractor may disclose Information to the extent required by law, provided that, subject to and without any waiver of the privileges and immunities of the United Nations, the Contractor will give the UNDP sufficient prior notice of a request for the disclosure of Information in order to allow the UNDP to have a reasonable opportunity to take protective measures or such other action as may be appropriate before any such disclosure is made.
- 13.4** The UNDP may disclose Information to the extent as required pursuant to the Charter of the UN, resolutions or regulations of the General Assembly, or rules promulgated by the Secretary-General.
- 13.5** The Recipient shall not be precluded from disclosing Information that is obtained by the Recipient from a third party without restriction, is disclosed by the Discloser to a third party without any obligation of confidentiality, is previously known by the Recipient, or at any time is developed by the Recipient completely independently of any disclosures hereunder.
- 13.6** These obligations and restrictions of confidentiality shall be effective during the term of the Contract, including any extension thereof, and, unless otherwise provided in the Contract, shall remain effective following any termination of the Contract.

#### **14.0 FORCE MAJEURE; OTHER CHANGES IN CONDITIONS**

- 14.1** In the event of and as soon as possible after the occurrence of any cause constituting force majeure, the Contractor shall give notice and full particulars in writing to the UNDP, of such occurrence or change if the Contractor is thereby rendered unable, wholly or in part, to perform its obligations and meet its responsibilities under this Contract. The Contractor shall also notify the UNDP of any other changes in conditions or the occurrence of any event that interferes or threatens to interfere with its performance of this Contract. On receipt of the notice required under this Article, the UNDP shall take such action as, in its sole discretion; it considers to be appropriate or necessary in the circumstances, including the granting to the Contractor of a reasonable extension of time in which to perform its obligations under this Contract.
- 14.2** If the Contractor is rendered permanently unable, wholly, or in part, by reason of force majeure to perform its obligations and meet its responsibilities under this Contract, the UNDP shall have the right to suspend or terminate this Contract on the same terms and conditions as are provided for in Article 15, "Termination", except that the period of notice shall be seven (7) days instead of thirty (30) days.
- 14.3** Force majeure as used in this Article means acts of God, war (whether declared or not), invasion, revolution, insurrection, or other acts of a similar nature or force.
- 14.4** The Contractor acknowledges and agrees that, with respect to any obligations under the Contract that the Contractor must perform in or for any areas in which the UNDP is engaged in, preparing to engage in, or disengaging from any peacekeeping, humanitarian or similar operations, any delays or failure to perform such obligations arising from or relating to harsh

conditions within such areas or to any incidents of civil unrest occurring in such areas shall not, in and of itself, constitute force majeure under the Contract..

## **15.0 TERMINATION**

- 15.1** Either party may terminate this Contract for cause, in whole or in part, upon thirty (30) days notice, in writing, to the other party. The initiation of arbitral proceedings in accordance with Article 16.2 ("Arbitration"), below, shall not be deemed a termination of this Contract.
- 15.2** UNDP reserves the right to terminate without cause this Contract at any time upon 15 days prior written notice to the Contractor, in which case UNDP shall reimburse the Contractor for all reasonable costs incurred by the Contractor prior to receipt of the notice of termination.
- 15.3** In the event of any termination by UNDP under this Article, no payment shall be due from UNDP to the Contractor except for work and services satisfactorily performed in conformity with the express terms of this Contract.
- 15.4** Should the Contractor be adjudged bankrupt, or be liquidated or become insolvent, or should the Contractor make an assignment for the benefit of its creditors, or should a Receiver be appointed on account of the insolvency of the Contractor, the UNDP may, without prejudice to any other right or remedy it may have under the terms of these conditions, terminate this Contract forthwith. The Contractor shall immediately inform the UNDP of the occurrence of any of the above events.

## **16.0 SETTLEMENT OF DISPUTES**

- 16.1 Amicable Settlement:** The Parties shall use their best efforts to settle amicably any dispute, controversy or claim arising out of this Contract or the breach, termination or invalidity thereof. Where the parties wish to seek such an amicable settlement through conciliation, the conciliation shall take place in accordance with the UNCITRAL Conciliation Rules then obtaining, or according to such other procedure as may be agreed between the parties.
- 16.2 Arbitration:** Any dispute, controversy, or claim between the Parties arising out of the Contract or the breach, termination, or invalidity thereof, unless settled amicably under Article 16.1, above, within sixty (60) days after receipt by one Party of the other Party's written request for such amicable settlement, shall be referred by either Party to arbitration in accordance with the UNCITRAL Arbitration Rules then obtaining. The decisions of the arbitral tribunal shall be based on general principles of international commercial law. For all evidentiary questions, the arbitral tribunal shall be guided by the Supplementary Rules Governing the Presentation and Reception of Evidence in International Commercial Arbitration of the International Bar Association, 28 May 1983 edition. The arbitral tribunal shall be empowered to order the return or destruction of goods or any property, whether tangible or intangible, or of any confidential information provided under the Contract, order the termination of the Contract, or order that any other protective measures be taken with respect to the goods, services or any other property, whether tangible or intangible, or of any confidential information provided under the Contract, as appropriate, all in accordance with the authority of the arbitral tribunal pursuant to Article 26 ("Interim Measures of Protection") and Article 32 ("Form and Effect of the Award") of the UNCITRAL Arbitration Rules. The arbitral tribunal shall have no authority to award punitive damages. In addition, unless otherwise expressly provided in the Contract, the arbitral tribunal shall have no authority to award interest in excess of the London Inter-Bank Offered Rate ("LIBOR") then prevailing, and any such interest shall be simple interest only. The Parties shall be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of any such dispute, controversy, or claim.

## **17.0 PRIVILEGES AND IMMUNITIES:**

Nothing in or relating to this Contract shall be deemed a waiver, express or implied, of any of the privileges and immunities of the United Nations, including its subsidiary organs.

## **18.0 TAX EXEMPTION**

**18.1** Section 7 of the Convention on the Privileges and Immunities of the United Nations provides, inter-alia that the United Nations, including its subsidiary organs, is exempt from all direct taxes, except charges for public utility services, and is exempt from customs duties and charges of a similar nature in respect of articles imported or exported for its official use. In the event any governmental authority refuses to recognize the United Nations exemption from such taxes, duties or charges, the Contractor shall immediately consult with the UNDP to determine a mutually acceptable procedure.

**18.2** Accordingly, the Contractor authorizes UNDP to deduct from the Contractor's invoice any amount representing such taxes, duties or charges, unless the Contractor has consulted with the UNDP before the payment thereof and the UNDP has, in each instance, specifically authorized the Contractor to pay such taxes, duties or charges under protest. In that event, the Contractor shall provide the UNDP with written evidence that payment of such taxes, duties or charges has been made and appropriately authorized.

## **19.0 CHILD LABOUR**

**19.1** The Contractor represents and warrants that neither it, nor any of its suppliers is engaged in any practice inconsistent with the rights set forth in the Convention on the Rights of the Child, including Article 32 thereof, which, inter alia, requires that a child shall be protected from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical mental, spiritual, moral or social development.

**19.2** Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon notice to the Contractor, at no cost to UNDP.

## **20.0 MINES:**

**20.1** The Contractor represents and warrants that neither it nor any of its suppliers is actively and directly engaged in patent activities, development, assembly, production, trade or manufacture of mines or in such activities in respect of components primarily utilized in the manufacture of Mines. The term "Mines" means those devices defined in Article 2, Paragraphs 1, 4 and 5 of Protocol II annexed to the Convention on Prohibitions and Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects of 1980.

**20.2** Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind of UNDP.

## **21.0 OBSERVANCE OF THE LAW:**

The Contractor shall comply with all laws, ordinances, rules, and regulations bearing upon the performance of its obligations under the terms of this Contract.

## **22.0 SEXUAL EXPLOITATION:**

- 22.1** The Contractor shall take all appropriate measures to prevent sexual exploitation or abuse of anyone by it or by any of its employees or any other persons who may be engaged by the Contractor to perform any services under the Contract. For these purposes, sexual activity with any person less than eighteen years of age, regardless of any laws relating to consent, shall constitute the sexual exploitation and abuse of such person. In addition, the Contractor shall refrain from, and shall take all appropriate measures to prohibit its employees or other persons engaged by it from, exchanging any money, goods, services, offers of employment or other things of value, for sexual favors or activities, or from engaging in any sexual activities that are exploitive or degrading to any person. The Contractor acknowledges and agrees that the provisions hereof constitute an essential term of the Contract and that any breach of this representation and warranty shall entitle UNDP to terminate the Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind.
- 22.2** The UNDP shall not apply the foregoing standard relating to age in any case in which the Contractor's personnel or any other person who may be engaged by the Contractor to perform any services under the Contract is married to the person less than the age of eighteen years with whom sexual activity has occurred and in which such marriage is recognized as valid under the laws of the country of citizenship of such Contractor's personnel or such other person who may be engaged by the Contractor to perform any services under the Contract.

## **23.0 AUTHORITY TO MODIFY:**

Pursuant to the Financial Regulations and Rules of UNDP, only the UNDP Authorized Official possesses the authority to agree on behalf of UNDP to any modification of or change in this Contract, to a waiver of any of its provisions or to any additional contractual relationship of any kind with the Contractor. Accordingly, no modification or change in this Contract shall be valid and enforceable against UNDP unless provided by an amendment to this Contract signed by the Contractor and jointly by the UNDP Authorized Official.

### Technical Evaluation Criteria

If the offer does not meet any of the minimum technical qualification criteria/requirements defined in the section 1,2, and 3 of the Technical Evaluation Criteria (presented below), it will be given score (0) and will be automatically disqualified and will not be considered for further evaluation.

Summary of Technical Proposal Evaluation form		Minimum Points Obtainable	Maximum Points Obtainable
1	Expertise of the Firm	170	200
2	Methodology, Its Appropriateness to the Condition and Timeliness of the Implementation Plan	300	400
3	Management Structure and Qualification of Key Personnel	230	400
	<b>Total</b>	<b>700</b>	<b>1000</b>

Section 1. Expertise of the Firm		Minimum Points Obtainable	Maximum Points Obtainable
1.1	<b>Reputation of Organization and Staff Credibility</b>		
	Recommendation Letters/Statements of Satisfactory Performance from at least 2 clients conforming that bidder successfully completed assignment implemented in Georgia <b>(minimum Requirement)</b>	<b>40</b>	40
	<i>Work experience / Reference with international/donor organizations in past 5 years will be an asset (an asset)</i>		10
1.2	<b>Experience of conducting of a face-to-face country-wide field work for surveys:</b>		
	5 years' experience in polling and surveys <b>(minimum requirement);</b>	<b>50</b>	50
	More than 5 years' experience in polling and surveys <b>(an asset);</b>		10
1.3	<b>The list of at least 3 survey report with summery description of survey topic, survey scope and used methodology, which will proof that company has:</b>		
	Institutional capacity of large-scale data analysis and experience of using inferential statistical analysis tools. <b>(minimum requirement)</b>	<b>30</b>	30
	Experience in using geo spatial data analysis tools and/or experience in doing agriculture surveys for international organization will be an asset		10
	Experience in doing agriculture surveys <b>(Minimum requirement)</b>	<b>40</b>	40
1.4	<b>Financial Capacity of the Organization</b>		
	Financial turnover-Bank letter certifying financial turn over minimum USD 80,000 (per year) during the last 2 years (minimum requirement).	<b>10</b>	10
		<b>170</b>	<b>200</b>
Section 2. Methodology, Its Appropriateness to the Condition and Timeliness of the Implementation Plan			
2.1	<b>Understanding of the requirements: Have the important aspects of the task been addressed in sufficient details?</b>		
	Important aspects of the task have been addressed in sufficient details <b>(minimum requirement)</b>	<b>100</b>	100
	Important aspects of the task have been addressed in exceeding details		50

2.2	<b>Description of Offer's approach and methodology for meeting or exceeding the requirements of Terms of Reference</b>		
	Approach and Methodology meets the requirements of the Terms of Reference <b>(minimum requirement)</b>	<b>100</b>	100
	Approach and Methodology exceed requirements of the Terms of Reference		50
2.3	<b>Assessment of the implementation plan proposed including whether the tasks are properly sequenced and if there are logical and realistic</b>		
	Tasks are properly sequenced, are logical and realistic <b>(minimum requirement)</b>	<b>100</b>	100
<b>Total Section 2</b>		<b>300</b>	<b>400</b>
<b>Section 3. Management Structure and Qualification of Key Personnel<sup>9</sup></b>			
3.1	<b>Project Coordinator</b>		
	At least 5 years of experience of management and coordination of survey projects <b>(minimum requirement)</b>	<b>40</b>	40
	More than 5 years of experience of management and coordination of survey projects		20
	Managing evaluation surveys (baseline, mid-line or final evaluations) will be an asset		20
	At least Master's degree in social sciences or another field relevant to the project; <b>(minimum requirement)</b>	<b>30</b>	30
	Ph.D. in social sciences or another field relevant to the project will be an asset		10
	Knowledge of Georgian and English is a must <b>(minimum requirement)</b>	<b>10</b>	10
3.2	<b>Key expert of thematic Field</b>		
	<i>At least 3-years' experience in Agricultural surveys (minimum requirement)</i>	<b>40</b>	40
	Working experience in the field of DRR, DRM, MHRM will be an asset		20
	Working experience in agrometeorology will be an asset		20
	Knowledge of Georgian and English is a must <b>(minimum requirement)</b>	<b>10</b>	10
3.3	<b>2 Key experts in sampling and questionnaire design</b>		
	At least 3 years of experience in sampling and questionnaire design <b>(minimum requirement)</b>	<b>40</b>	40
	More than 3 years of experience in sampling and questionnaire design		20
	Experience in sampling and questionnaire design in agricultural surveys will be an asset		20
	Knowledge of Georgian and English is a must <b>(minimum requirement)</b>	<b>10</b>	10
3.4	<b>Key experts in statistical analysis</b>		
	At least 5 years of experience in statistical analysis of data <b>(minimum requirement)</b>	<b>40</b>	40
	More than 5 years of experience in statistical analysis of data		20

<sup>9</sup> Note: It is possible to combine several expert functions in one individual, provided that the candidate fully meets all needed qualifications

	Experience in statistical analysis of data for agricultural surveys will be an asset.		20
	Knowledge of Georgian and English is a must ( <b>minimum requirement</b> )	<b>10</b>	10
<b>Total Section 3</b>		<b>230</b>	<b>400</b>



## TERMS OF REFERENCE

**Projects:** “Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia”

**Proposal Title:** Baseline survey on knowledge, Awareness and Practices (KAP) of potential beneficiaries on local climate risk management options (including use and impact) and baseline study of Impact evaluation for structural measure.

**Duration of Contract:** 2.5 months

### 1. BACKGROUND

Green Climate Fund (GCF) funded project “Scaling-up multi-hazard early warning system and the use of climate information in Georgia” aims at creating a proactive integrated climate risk management approach through the establishment of a country-wide multi-hazard early warning system (MHEWS) and the use of climate information (CI) in planning and decision-making.

The project objective is to reduce exposure of Georgia’s communities, livelihoods and infrastructure to climate-induced natural hazards through a well-functioning nation-wide MHEWS and risk-informed local action.

The implementation spans a period of seven years (2019-2025) and is led by the Ministry of Environment Protection and Agriculture (MoEPA), in collaboration with a multiplicity of stakeholders: NEA, the Environmental Information and Education Center (EIEC), the Ministry of Regional Development and Infrastructure, as well as local governments.

The project focuses on all 11 major river basins through non-structural measures (such as Agro-forestry) and 13 intervention sites through structural measures (such as wire mesh mat linings, gabions, embankments, concrete regulation walls, and riverbed and channel cleaning). The project consists of three components, and each of them of several activities:

- Component 1: Expanded climate-induced natural hazard observation network and modelling capacities to secure reliable information on climate-induced hazards, vulnerability and risks
  - Activity 1.1: Expansion of the hydrometric network
  - Activity 1.2: Floodplain zoning based on hazard and risk maps for all major river basins and hazard and risk maps for key climate-induced hazards
  - Activity 1.3: Introduction and implementation of methods and tools for the systematic gender-sensitive socio-economic vulnerability assessment for decision making for prioritisation of resilience investments
  - Activity 1.4: A centralized multi-hazard disaster risk information and knowledge system
- Component 2: Multi-hazard early warning system and new climate information products supported with effective national regulations, coordination mechanisms and institutional capacities
  - Activity 2.1: Institutional and legal frameworks, public-private partnerships and associated institutional capacity building for the MHEWS and for the enhanced use of climate information by the public and private sectors
  - Activity 2.2: Development and implementation of the MHEWS covering all river basins
  - Activity 2.3: Enhancing access to and the use of weather and climate information and agrometeorological information services by farmers and agricultural enterprises

- Activity 2.4: Multi-hazard risk management planning platforms
- Component 3: Improved community resilience through the implementation of the MHEWS and priority risk reduction measures
  - Activity 3.1: Implementation of Community Based Early Warning System (CBEWS) and community-based climate risk management (CBCRM)
  - Activity 3.2: Public awareness and capacity building programme at all levels to effectively deliver climate risk information and training to communities and local first-responders
  - Activity 3.3: Implementation of risk reduction interventions that would significantly reduce the risks against which the MHEWS will operate

This specific assignment concerns 3.2 and 3.3 activities which are explained in more details below.

**Activity 3.2: Public awareness and capacity building to effectively deliver climate risk information for communities and local first-responders** – The public awareness and capacity building of communities and the other users of the MHEWS is a critical component of the successful and effective MHEWS. The GCF project will assist the government of Georgia in shifting from ad-hoc project-based awareness and education efforts to a planned, consistent and sustainable national-led information and communication system for enhanced climate and disaster risk management.

This activity will be led by the EIEC under the MoENRP who has a mandate as well as experience in environmental outreach, education and capacity building. National and municipal level response trainings for officials will be carried out through cooperation of the EIEC and EMA. Community level awareness raising and informal education activities will be carried out in close cooperation with NGOs having grassroots capacity building and information. More specifically, following interventions will be implemented under this activity:

i) enhancing the capacity already built within the EIEC, ii) capacity building at central, municipal and community levels on MHEWS and MHRM, iii) capacity building and awareness raising of municipal authorities, local NGOs, CBOs or non-CBO community members in Community-based Risk Assessment approaches, Community-based Early Warning Systems and gender-responsive Community-based Multi-Hazard Risk Management, iv) development and application of generic education materials and 5-year training programmes on DRR for schools and universities, v) networking and advocacy – annual community CBMHRM and CBEWS forums, CBO award competition, community-government and PPP dialogues, vi) youth engagement and, pre-school and school education on MHRM/DRR and CBEWS, vii) national-wide media campaign on gender-responsive MHRM and EWS.

**Activity 3.3: Implementation of risk reduction interventions that would significantly reduce the risks against which the MHEWS will operate**

Activity 3.3 will implement priority structural intervention measures in high risk areas (based on sound cost-benefit analysis) to reduce the risks that the MHEWS will be designed to address. The aim is to provide infrastructural measures, such as wire mesh mat linings, gabions, embankments, concrete regulation walls, and riverbed and channel cleaning, to protect the most exposed communities against floods and mudflows. **An increased level of physical protection can then lead communities to make more livelihood-enhancing, long-term investment plans that would otherwise not be possible in anticipation of frequent damages.**

Initially, 21 sites were subjected to conceptual engineering investigation and the broad costs of mitigation work quantified: 9 sites were investigated in West Georgia, largely flood mitigation in the Rioni catchment and 12 sites in Eastern Georgia associated with sediment extraction to mitigate the deleterious effects of mudslides and also flood mitigation.

Prioritization of the 21 sites was undertaken, applying multi-criteria analysis, including preliminary Cost-Benefit Analysis (CBA). The measures were evaluated using a number of social-economic criteria:

- Highest NPV
- Highest BCR
- Greatest number of properties benefiting

- Greatest number of people benefiting
- Greatest area of agricultural land protected
- Combinations of these

For simplicity each of the targeted 21 sites was ranked for the first 5 criteria and ranks added. As a result, 13 sites have been short-listed for the GCF investment (Investment priority ranking results are summarized in [Table #1](#) below). Based on the outcomes of the preliminary CBA, the technical design and costing of the short-listed structural measures were reconfirmed for these 13 sites through another series of field inspections, consultations with the local and national stakeholders, and technical expert/engineer review.

Following the above two-phased prioritization exercise, a social and environmental assessment was conducted for the selected sites/measures, a Social and Environmental Management Framework (SEMF) was developed, the Operational and Maintenance costs were assessed, and the refined CBA have been prepared for the final list of 13 priority measures. for the detailed CBA analysis and outline studies please refer to [Annex #b](#)

Figure #1: Theory of Change – Structural measures

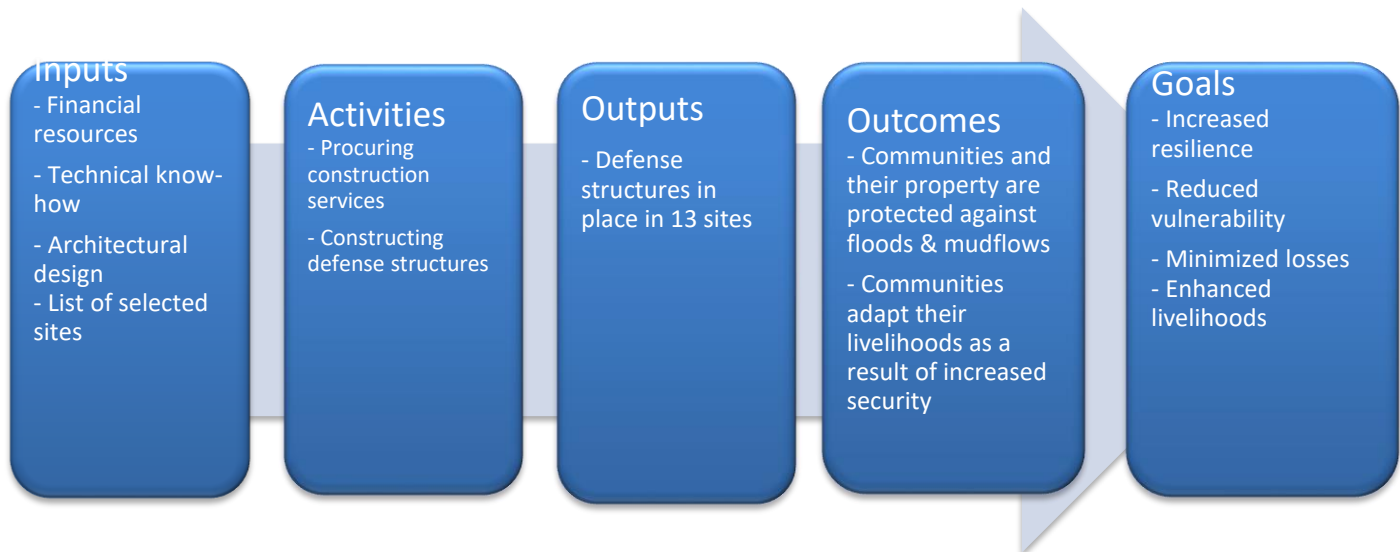


Table #1: Summary of 13 intervention sites for structural measures

MITIGATION MEASURES														
East Georgia West Georgia		Estimated	NPV	NPV	BCR	BCR	Protected							
#		Capital	GEL	Rank	Rank	Property	Property	People	People	Land (Ha)	Land	Total	Investment	
		Cost (USD)					Rank	Rank	Rank					
1	Rioni river, left bank – Gaghma Kodori: wire mesh mat lining with length 250 m.	291,250	17,281,063	4	20.59	4	581	3	807	3	846	2	16	1
2	Rioni river, right bank – Sagvichio: wire mesh mat lining with length 600 m.	699,000	18,221,522	3	9.61	5	261	6	372	5	877	1	20	2
3	Liakhvi river, left bank – Gori city: concrete regulation wall on drilled shafts 200 m.	545,580	33,097,836	2	23.24	3	492	5	1994	2	0	10	22	3
4	Lagodekhiskevi river, right bank – Lagodekhi: wire mesh gabion wall with length 300 m.	168,990	14,933,637	6	26.34	1	523	4	775	4	0	10	25	4
5	Achkva river – Kobuleti: reconstruction of the water regulation facility, canal widening and lining	4,275,604	16,856,553	13	0.22	13	675	2	2297	1	0	10	39	8
6	Khodashniskhevi river – riverbed cleaning (5,300m), channel cleaning (3,000m), wire mesh gabion	1,372,300	16,959,969	5	3.87	7	110	7	108	7	565	3	29	6
7	Rioni river, right bank – Sirachkoni: wire mesh mat lining with length 500 m.	582,500	1,699,952	8	1.96	8	4	12	3	11	213	5	44	10
8	Rioni river, left bank – Naronali: wire mesh mat lining with length 550 m.	640,750	1,481,973	9	1.76	9	37	9	30	9	201	6	42	9
9	Tskhenistskali river, left bank – Gautskinari: wire mesh mat lining with length 500 m.	582,500	374,078	12	0.79	12	13	11	10	10	60	8	53	13
10	Rioni river, left bank – Vazisubani: wire mesh mat lining with length 350 m	407,750	258,140	11	0.79	11	31	10	49	8	48	9	49	12
11	Rioni river, left bank – Patara Poti: wire mesh mat lining with length 2000 m.	2,330,000	178,805	10	0.97	10	50	8	153	6	257	4	38	7
12	Alazani river, right bank – Miliari: embankment with length 350 m.	207,000	2,387,309	7	4.04	6	0	13	0	12	100	7	45	11
14	Telaviskhevi river – removal of debris and vegetation (800 m)	195,600	43,148,382	1	23.26	2	731	1	0	12	0	10	26	5
TOTAL		12,298,824					3,508		6,598		3,167			
East Georgia estimated costs		2,489,470												
West Georgia estimated costs		9,809,354	NOTE : Sites 14 and 15 are combined in 14											

NOTE : Sites 14 and 15 are combined in 14

## 2. **AIM OF THE ASSIGNMENT**

Structural flood protection investment is expected to reduce both perception of risks and uncertainties that impacts households and communities living in the flood prone areas. The assignment will be one survey with two main **goals**:

1. To collect baseline information:
  - i. On knowledge awareness and Practices (KAP) of beneficiaries (communities) on local climate risk management options prior to conducting awareness rising activities and
  - ii. On existing practices on DRR DRM and MHRM in schools' kindergartens and municipalities
2. To collect baseline information on perception of risks and uncertainties that impacts households and communities living in the flood prone areas, prior to constructing defense structures against natural hazards such as mud flows and floods. This will include collecting information on agricultural production process of farmer in the municipalities and the kind of risks that they are faced including risk preferences.

The survey should be conducted in a way to allow for conducting end line survey in 2025 to capture changes in community's perception and risk preference of farmers.

## 3. **Methodology of Survey**

To understand the impact of the structural flood measures on perception and responses to changes in risk and uncertainties, various methodologies will be applied that ranges from analysis of a Knowledge, Attitude and Practices (KAP) survey to a detailed economic model of household's preference for risk and uncertainty. Economic analysis of risk and uncertainty will estimate the benefits of investments that reduce risks and uncertainties.

More specifically for the survey mixed methodology will be applied:

**Household survey** – a) to understand knowledge awareness and practices (KAP) of beneficiaries on local climate risk management options and b) to collect baseline information on perception of risks and uncertainties that impacts households and communities living in the flood prone areas, prior to constructing defense structures. In addition to collect information on current coping mechanisms ( compensation received after floods; households borrowing to recover from floods; money or goods received from different sources after flooding (government/charity/NGO etc.); households' satisfaction with current level of protection against annual flood events; households that have had to evacuate due to flooding; households perception of increased flood risk in the past 10 to 20 years; Households perception of whether extreme floods will increase in future and etc)

**Key Informant interviews (KIs)**- to understand existing practices on DRR DRM and MHRM in schools' kindergartens and municipalities. Also, KIs of municipality officials on (1) expenditure patterns of the municipality and how that has evolved over time. (2) what are the major barriers to increased expenditure in the municipality? (3) what role has increased flooding played in expenditure patterns of the municipality. (4) without flooding risk, how will the expenditure pattern at the municipal change?

**Document review** – to understand if schools' kindergartens and local municipalities have any programs or experience in DRR DRM and MHRM. This will also include reviews of previous damages and nature of the damage in the area. Literature review on insurance premiums on housing and how it has changed over time.

### **Indicators to be measured**

Survey aims to answer the question of whether providing communities with supplementary protection against extreme natural hazards, such as floods and mudflows, by constructing robust defense structures, actually changes communities' perception of their safety and resilience, and maybe changes their attitudes and plans

towards long-term planning and investment and measures the knowledge awareness and practices (KAP) of beneficiaries on local climate risk management options. The indicators for which baseline needs to be set are listed below:

**Impact Evaluation:**

- Physical damage and loss of life in the aftermath of natural hazards
  - Number of injuries
  - Number of deaths
  - Crop loss/ livestock loss/ destroyed buildings
  - Monetary value of damages
- Awareness of DRR, DRM and MHRM.
- Reported perception of own safety
- Crop diversification measured by number of crops planted per season
- Number of high-risk cash crops planted per season to measure perception of risk
- Plans of long-term investments and/or realized investments
- Asset index - composition of agricultural assets
- Income
- Existing coping mechanisms
- agricultural census statistics with farm-level observations on area allocated to each crop, crop output and expenditures on labor, pesticides and fertilizers by municipality.
- historical input and output prices of major crops

**For KAP:**

- Knowledge, Awareness and Practices of beneficiaries on local climate risk management options
- Existing practice of DRR, DRM and MHRM in school and kindergartens
- Existing practice of DRR DRM and MHRM in municipalities.

**In addition, survey should design a framework to estimate baseline for below listed indicators from logframe:**

#3.2 - % increase of crop yields and household income for targeted communities due to reduced losses and damages from hazards

#3.3 Number of targeted beneficiaries reporting enhanced protection from climate related natural disasters resulting from Fund investments (disaggregated by gender).

#3.4 - Change in Knowledge, Awareness and Practices (KAP) of beneficiaries on local climate risk management options (including use and impact of the options)

**Sampling Approach**

Primary data will need to be collected in different flood areas of Georgia with agricultural land. Based on the existing information on potential beneficiaries (see the table #2) hired company will be responsible to develop the sampling approach in close collaboration with project team. Collected data should be representative by gender and allow for disaggregated analysis.

**4. SCOPE OF WORK AND EXPECTED OUTPUT**

**• Geographical scope**

**Quantitative survey:** Primary data will need to be collected in different flood areas of Georgia with agricultural land. Sampling will be stratified by level of vulnerability to flood – for example - chronically flood prone, occasionally flood prone and areas that are flood free. Within each category, farmers or communities/villages will be randomly selected (if randomization is at the community/village level, all the farmers within the community/village can be selected or a percentage of them depending on the population). This will be informed

based on assessment of farmers by flood level. The flood free areas will be mapped based on spatial distance to the chronically and occasionally flood prone areas.

Survey for the flood prone areas will be representative of the population who will benefit from structural measures, living in the areas of 13 intervention sites (about 10,000 people) covered by project. For the list of the potential beneficiary communities/villages and cities<sup>10</sup>, please refer to the table #2.

**Qualitative survey:** through document review and with KIs hired company should understand existing practice on Disaster Risk Reduction (DRR), Disaster Risk Management (DRM) and on Multi Hazard Risk Reduction Management (MHRM) in schools and in kindergartens around those 13 intervention sites, in total company will be responsible to survey up to 33 schools and 42 kindergartens in 11 villages and 4 cities (For the detailed list, please see the table # 2). One interview per each school and kindergarten should be conducted. In addition, contracted company should conduct KKIs with local municipality representatives on DRR, DRM and MHRM practice, one interview in each municipality (10 municipalities, list below).

**Table #2: Potential beneficiaries of structural measures and list of municipalities, schools and kindergartens to be interviewed.**

Municipality	Village	# of Population living in the area (census data)	# of Beneficiaries defined by CBA report <sup>11</sup>	# of Schools	# of Kindergartens
<b>Abasha</b>	Gaghma kodori	259		0	0
	Ketilauri	377		1	1
	Guleikari	321		1 school (with only 4 student, its part of ketilauri school)	0
	Pirveli Maisi	661		1	1
<b>Senaki</b>	Isula	528		0	1
	Sagvichio	10			0
<b>Akhmeta</b>	Ojio	680		1	1
	Zemo Khodasheni	868			1
<b>Khobi</b>	Sagvichio	531		1	1
	Shavgheli	581		1	1
<b>Samtredia</b>	Koreis ubani	59		0	0
<b>Gori city</b>			1994	12	18
<b>Lagodekhi City</b>			775	2 school (#1 & #3)	3
<b>Kobuleti City</b>			2297	5 school (#1, #2, #3, #5, #6)	7
<b>Telavi City</b>			TBD	9	7
<b>Signagi</b>	Milari	3 <sup>12</sup>			
<b>Total</b>		4,878	5,067	33	42

<sup>10</sup> As per Cost Benefit Analysis report, annexed to the ToR, in case of the cities not the whole population of the cities are defined as beneficiaries, thus using the GIS tools, hired company will be responsible to identify the list of beneficiary neighborhoods in the listed cities, based on CBA report.

<sup>11</sup> As it was mentioned above hired company will be responsible to define the list of beneficiary neighborhoods to survey, based on the CBA report.

<sup>12</sup> Those who own agricultural land around the site.

**Document Review:** Hired company will be responsible to review the kindergarten and school curriculums and learning materials and municipal level documents/budgets on DRR, DRM and MHRM, in addition, a set of project related documents as well as country specific DRR, DRM and MHRM advocacy related materials (current projects, national and international reports, surveys, statistics, policies, laws and etc.) may be useful to gain comprehensive understanding of the situation in Georgia.

- **Update of Survey Design Document**

International consultant of UNDP developed the design of the survey (for the details of the design document please refer to the **Annex #a**). Hired company, in close collaboration with international consultant of UNDP, will be responsible to elaborate the design document (adding sampling approach the list of indicators to be measured and etc.), considering local context and new available information on potential beneficiaries of structural measures.

- **Development of the Questionnaire and questionnaire pre-testing**

The questionnaire should be developed by contracted company which should cover (but not limited) following indicators:

- Physical damage and loss of life in the aftermath of natural hazards
- Awareness of DRR, DRM and MHRM.
- Reported perception of own safety
- Crop diversification measured by number of crops planted per season
- Number of high-risk cash crops planted per season to measure perception of risk
- Plans of long-term investments and/or realized investments
- Asset index
- Income
- The knowledge, Awareness and Perception of potential beneficiaries on local climate risk management options
- logframe indicators (listed above)

- **Field work**

The survey should apply the method of *face-to-face interviews* by specially structured questionnaires in case of household survey and semi-structural interview guide for school, kindergarten and municipality representatives. Preference will be given to firms that can implement the household survey using a Computer-assisted personal interviewing (CAPI).

**Quality control.** The contractor should implement quality control measures to ensure a high level of interviewer performance. A full description of these measures and the results of the quality control must be included in the final report. Non-responses must be recorded in an appropriate form.

At least 10% of the total number of interviews should be verified. Quality control should be spread throughout the survey area and the distribution of controls should be proportional to the sample distribution. 10% of the work of each interviewer should be witnessed by his/her supervisor.

Interviewers should at all times carry a field log in which they record relevant information on what happens in the field, such as contact and call-back details. The interviewer logs must supply enough information for an independent observer to locate the selected household and to identify the respondent interviewed.

**Technical report:** a full technical report on the Field Work shall be provided to the UNDP by the contractor including but not limited to the following:

- analysis of the field work process
- definition of the target population sampled, the number of persons in the target group, the number of people excluded from the sample and the reasons for such exclusions;
- refusal and non-response rates, and typical reasons for both forms of non-participation;

- a description of quality control measures implemented, and the results of interview verification procedures.

- **Data processing**

The obtained data should be processed by means of relevant software. The contractor should ensure coding of the obtained data, and clearance, correcting technical and logical errors.

The data files should be provided to the UNDP. The contractor should provide the UNDP with various breakdowns of the data file and data per UNDP request.

- **Data analysis and Reporting**

Based on the survey results, the organization shall produce **two analytical report** detailing the major findings in terms of Knowledge Awareness and Practice of potential beneficiaries of EIEC and second report for Impact evaluation purposes.

The survey should produce the data necessary to identify the baseline situation, allow the analysts to interpret it at target group level and make various breakdowns as necessary (all data should be gender desegregated).

The contractor should elaborate the **Survey Results Report** containing primary data, interpretation of quantitative survey data using the relevant inferential statistics and graphical presentations (charts, tables and others as necessary per consultations with UNDP) of the data in **Georgian and English languages**. The Draft report shall be presented to UNDP before finalization for feedback and comments.

*Note: The complete data base shall be property of UNDP and the organization will have no rights to use its results, other than for the current assignment. Neither, the organization will have the right to transfer it to anyone without a prior written consent of UNDP.*

## 5. TIMING

N	Activity	Month		
		Month1	Month 2	Month 3
1	Updating survey design including sampling design			
2	Developing survey questionnaire			
3	Survey preparation (recruitment of the personnel, training, logistical plan)			
4	Field Work			
5	Data cleaning and processing			
6	Data analysis and report preparation			
7	Final report			

## 6. DELIVERABLES

The organization is expected to produce the following deliverables:

### 5. Updated survey design including (October):

1.5. **Finalised instruments** adapted to after piloting and consultations with the UNDP.

1.6. **Sampling methodology and framework** - outline of the sampling design showing its attributes (age, gender, place of residence, social status and others.)



- 1.7. **Evaluation matrix**
- 1.8. **Detailed timeline** – defining details for each step of survey.
- 6. **Technical Report** compliant with the requirements as detailed above (Mid-November);
- 7. **Database of the survey data** processed by means of the relevant software (End November).
- 8. **Draft and Final survey reports (two reports) in both Georgian and English Languages– one for KAP and one for Impact Evaluation** containing interpretation of quantitative survey data and graphical presentations (charts, tables and others as necessary per consultations with UNDP) of the data in Georgian and in English languages. (Mid December)

Successful company will be paid in three instalments after satisfactory accomplishment of each step/deliverable mentioned above. UNDP will make the payment immediately after satisfactory receipt of the due deliverable and a respective invoice.

## **7. QUALIFICATIONS OF THE SUCCESSFUL SERVICE PROVIDER AT VARIOUS LEVELS**

### **7.1. Expertise of the Service Provider**

Applicant organization (or its branch) should be registered in Georgia and must demonstrate the capacity and ability to carry out surveys in the relevant fields in terms of past relevant experience, economic and financial capacity, general management, availability of qualified professional staff, and the demonstrated ability. **For detailed requirement please refer to the ANNEX 2 section A of this RFP.**

### **7.2. Key Personnel**

The organization/institution should provide an organizational chart of the team structure, together with a description of the composition of the team and task assignment. The organization/institution should present the following information and documents:

- a) Names and qualifications of the key personnel that will perform the services indicating who is team Leader/project coordinator, who are supporting, the list of experts involved etc.
- b) CV demonstrating qualifications must be submitted and
- c) Written confirmation from each personnel that they are available for the entire duration of the contract

Company shall propose at least – Project coordinator for managing and coordinating the survey, one thematic expert, two experts in sampling and questionnaire design and one expert in statistical analysis. Company may propose other relevant consultants/experts as deemed appropriate to the assignment. (Note: it is possible to combine several expert functions in one individual, provided that the candidate fully meets all needed qualification). **For detailed requirements please refer to the ANNEX 2 section C of this RFP.**

### **7.3. Recommended Presentation of Proposal**

The Proposal should be submitted according to the forms and instructions given in the RFP.

### **7.4. Criteria for Selecting the Best Offer**

Selection of service provider will be based on Combined Scoring method – where the qualifications and methodology (Technical Proposal) will be weighted a maximum of 70% and combined with the price offer (Financial Proposal) which will be weighted a maximum of 30%. **For detailed evaluation criteria please refer to the ANNEX 4 of this RFP.**

## **7. PAYMENT MODALITY**

Company will be paid in three instalments upon satisfactory accomplishment of each of the above-mentioned phase and according to the following scheme:

Deliverable	Amount to be paid
<b>1) Updated survey design</b>	25%
<b>2) Technical Report and 3) survey database</b>	25%
<b>4) Final survey reports</b>	50%

## Measuring the impact of structural flood protection investment.

### Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information in Georgia

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## Background:

Due to the complex mountainous terrain and climate, Georgia is subject to both geological and hydro-meteorological hazards. According to Georgia's 2nd and 3rd National Communications and other studies,<sup>13</sup> under climate change the frequency, intensity and geographical spread of extreme hydrometeorological hazards will increase. Georgia's INDC estimates economic losses from climate-induced hazards without adaptation measures for the period 2021-2030 to be \$US 10-12 billion, while the cost of adaptation measures is estimated to be 1.5-2 billion USD.<sup>14</sup>

The estimated economic losses underestimate the cost of the hazards given that it typically ignores the impact it has on risk and uncertainty in the communities and how the communities and individuals hedge against those risks and uncertainties.

To reduce climate change impacts, the project is developing a multi-hazard early warning system which is an essential element of any country's climate risk management framework and which will serve 1.7 million ordinary Georgians currently at risk from climate-induced hazards. Appraisal of the investment indicated that one of the benefits of the project will be damages avoided to property and agriculture from the construction of flood mitigation works at 13 locations short listed in both East and West Georgia. These are primarily from putting in place structural flood protection in the form of priority risk reduction interventions for areas where risk from climate-induced natural hazards is highest.

Types of risk reduction measures to be implemented include:

1. Construction of embankments (using boulders or gabions)
2. River bank protection (wire mesh lining)
3. Sediment extraction, removal of debris and vegetation

<sup>13</sup> World Bank project: *Reducing the Vulnerability of Georgia's Agricultural Systems to Climate Change*; USAID/GLOWS project: *Integrated Natural Resources Management in Watersheds of Georgia*; *Regional Climate Change Impacts for the South Caucasus Region* funded through ENVSEC (Environmental Security) initiative and commissioned by UNDP

<sup>14</sup> Georgia's Intended Nationally Determined Contribution submission to the UNFCCC

#### 4. Channel widening

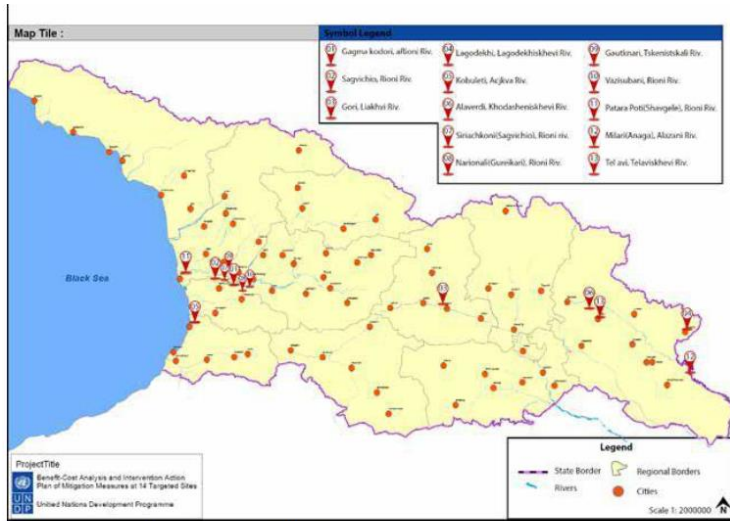


Figure 3: Location of the 13 sites for structural measures

Structural flood protection investment is expected to reduce both perception of risks and uncertainties that impacts households and communities living in the flood prone areas. The project will develop climate risk information products for population at risk of climate induced extreme hydromet risks to

1. safeguard lives
2. Protect livelihoods
3. Protect assets

The structural measures will protect two areas:<sup>15</sup> agricultural land at risk and properties through structural flood protection. The ranking of the top nine sites from the cost-benefit analysis is presented in Table 1.

**Table 1: Summary of benefits for top 9 projects with and without agricultural benefits**

Rank	Only properties included				Agriculture and Properties included			
	Site #	Number Properties Protected	Net Present Value (GEL million)	Benefit Cost Ratio	Site #	Ha Agriculture	Net Present Value (GE million)	Benefit Cost Ratio
1	21	492	32.3	15	3	846	17.3	22
2	18	775	14.4	14	2	877	18.2	10
3	9	675	3.9	5	21	0	32.4	16
4	12	647	7.0	2	18	0	13.3	14
5	3	581	3.6	5	9	0	3.9	5
6	2	261	3.5	3	12	0	7.0	2
7	1	139	(-) 1.2	0.2	6	213	2.5	4
8	13	109	0.8	1	4	201	0.7	1
9	7	13	(-) 0.4	0.5	7	60	0.5	2

<sup>15</sup> Additional indirect impact of the project to be achieved through enhanced climate information and advisories for agricultural sector, improved legal framework and floodplain development zoning, and enhanced adaptation planning. These project deliverables will reduce the risk from all hazards on 325,020 ha of agricultural land currently at risk and reduce the annual agricultural losses from flooding which are currently assessed at US\$ 67.8 Million, as well as reduce annual damages from the extreme flood events that are currently assessed at US\$ 189.9 Million.

## Estimating the impact of the structural measures.

As described earlier, the structural measures are expected to increase perception of risks and uncertainties by households and communities in the areas where they will be implemented. This change in perception is expected to spur investment and economic growth in the communities that has been suppressed by climate hazards and risks. This is in addition to the traditional benefits of the avoided damages from lives and properties at risk.

The traditional benefits of the structural measures are relatively easy to measure, it is based on the estimate of damages that we avoid given the properties and agricultural land will no longer be flooded with construction of embankments (using boulders or gabions); River bank protection (wire mesh lining); sediment extraction, removal of debris and vegetation; and channel widening.

However, to understand the impact of the structural flood measures on perception and responses to changes in risk and uncertainties, various methodologies will be applied that ranges from analysis of a Knowledge, Attitude and Practices (KAP) survey to a detailed economic model of household's preference for risk and uncertainty. Economic analysis of risk and uncertainty will estimate the benefits of investments that reduce risks and uncertainties.

### *Perception, risks and uncertainty by type of beneficiary.*

Three types of beneficiaries can be identified and how they perceive and respond to risk and uncertainty differs. We will discuss how to measure impact of the project on each of them.

1. **Households with agricultural land at risk:** with climate threat, farmers can be impacted by climate extremes. The impact on their livelihood is however a function of how the risk enters their production function. The methodology presented here will be based largely on estimating decision making under risks and understanding how this will change with or without the project.
2. **Households with assets at risk:** this type of beneficiaries are primarily going to benefit from the project as a result of reduced damages to properties in the area. These properties include houses and agricultural assets. Damage and loss data and accounting collections methods at municipal level are to be established by the project. This will include agricultural losses accounting and can use used to determine any reduction in losses before and after structural interventions (depending on whether significant events occur during the project). Also, the damage and loss model (for Rioni) which is to be scaled up nationally, has a detailed method for calculating damage to agricultural crop (down to the level of each farm land) based on depth of flooding (which will change with structural measure being put in), time of occurrence flood (i.e. stage of crop development), crop type value. This will be used to calculate avoided agricultural losses. Property values will also be expected to increase with reduction in insurance premium for the houses too as a result of the project. The impact of the project on households with assets can be monitored and evaluated through house prices and insurance premiums analysis with new buildings/houses in the areas where the structural measures will be implemented. Things to track include:
  - a. Historical insurance premium of houses in the area
  - b. House prices per square foot in the area
  - c. Historical damage estimates and category of the flooding
3. **Communities where growth is impeded due to climate risk:** it is assumed that development has stalled due to increased climate threat. Investment by the community due to reduced risks – will communities put in better infrastructure now that risks and uncertainties are reduced? To understand the impact on this, we will review budgets and conduct key informants' interview with municipality representatives and officials to track the potential for communities to increase investments and the opportunity cost of those investments.
  - a. Historical budget of municipalities by year.
  - b. Historical break down of expenditure of municipality by sectors/areas.

- c. Desk review of development plans of municipalities
- d. Key informant interviews to help interpret the changes in budget and expenditure patterns.

The rest of this note will focus on understanding the impact of the project on agricultural land protected given that (2) and (3) are easier to measure and track through the project's standard monitoring of the project.

## **Impact of project on Households with agricultural land at risk.**

Agricultural households are used to making decision under uncertainties. Different uncertainties exist for farmers including production uncertainty, price uncertainty, technology uncertainty, policy uncertainty and climate/weather uncertainty.

The impact of the project will be estimated by looking at the impact of climate/weather uncertainty and risk on household preferences and production decision making and estimating how those decisions will change with the project. Agricultural households are argued to be maximizing expected utility when there are risks. Their perception of the risk and how it affects their preferences will be important in the optimization process.

### **Agricultural production in the project sites - Crop Production: Recent Performance and Future Trends**

As part of the baseline survey, information on crop area, production and yield will be collected to help understand the type of risks that farmers face in the area. Across the country, cereals (i.e. maize, wheat and barley) are the main annual crops grown in Georgia, with an average of 184,100 ha being cultivated annually between 2010 and 2014. Maize is the principal annual crop, with 44% of the annual crop area, followed by wheat (17%). Potatoes and vegetables are also important annual crops accounting for 8% and 7% of the annual crop area respectively. Other crops grown include beans, sunflower, melons and grasses. Between 2000 and 2010, the overall area of annual crops declined by about 40% (or 193,520 ha). With greater investment in the agricultural sector, it is anticipated that the areas of annual crops will steadily increase over the next 10 years, reaching around 327,000 ha by 2025, an increase of about 21%. It is expected that future cropping patterns would remain broadly similar to present ones, though there may be a relatively larger increase in the proportions of potatoes and vegetables. The average area of perennial crops between 2010 and 2014 was estimated at 127,160 ha, of which vineyard grapes were the most important (41% of perennial crop area). Other perennial crops included apple/pear (14%), hazelnut/walnut (15%), citrus fruits (13%) and stone fruits (5%). Between 2000 and 2010, the overall area of perennial crops fell by 34,255 ha (20%). The areas of apple, pear, and tea experienced the most marked declines, but there were only relatively small drops in the areas of grapes and stone fruit. In contrast, there were increases in the areas of citrus fruit (by 28%) and hazelnut/walnut (by 52%). With improved agricultural infrastructure and support services, the area of perennial crops is projected to expand by 26,000 ha (20%) to reach 153,100 ha by 2025. With the exception of tea, it is expected that the crop areas will increase in similar proportions, so the perennial cropping patterns will remain broadly unchanged.

## **Methodology – Measuring response to current flooding risk**

The current assumption is that food risk in Georgia has impacted farmers in the regions. The expectation is that in order to minimize this risk, different agricultural practices would have been adopted especially in the absence of crop insurance. Farmers typically adopt practices to self-insure against such hazards. This is typically by adjusting crop pattern across crops and/or season. Farmers adjust crop types in order to cope with drought episodes and adopting to flood is also similar. Similarly, for flooding, farmers will be expected to adjust production system to self-insure against flooding even if it's not the most efficient technology mix.

There are different coping mechanisms that have been shown that farmers in flood prone areas typically resort to as self-insurance. This include reducing production during flooding periods (Mandal, 2010 and Goyari, 2005); diversified cropping pattern to cope with risk and uncertainty associated with agriculture due to climate risks – risk aversion strategy (Shiyani and Pandya, 1998 and Blade and Slinkard, 2002)

The first step is to understand how flood risk has affected diversification of crops. In the agricultural context, diversification can be regarded as the re-allocation of some of a farm's productive resources, such as land, capital,

farm equipment and labor to other products and, particularly in richer countries, to non-farming activities such as restaurants and shops. Factors leading to decisions to diversify are many, but include: reducing risk, responding to changing consumer demands or changing government policy, responding to external shocks and, more recently, as a consequence of climate change.<sup>16</sup>

There are several measures of crop diversification including Herfindahl Index, Ogive Index, Entropy Index, Modified Entropy Index and Composite Entropy Index. Composite Entropy Index (CEI) appears to be most suitable. The CEI extends the EI and MEI by providing a standard scale for measuring the degree of diversification and reduces the sensitivity of changing the number of crops.

$$CEI = - \left[ \sum_{i=1}^N P_i \log_N P_i \right] \left[ 1 - \left( \frac{1}{N} \right) \right]$$

where  $P_i$  represents proportion of total cropped area under crop 'i' and N is total number of crops grown. The CEI increases with rise in diversification and vice versa. Its value ranges between zero and one. It considers the shares of each crop in total cropped area as well as number of crops grown.

Since the focus of interest is whether crop diversification has led to mitigating flood induced limits and risk, farmers close to the food prone areas will be expected to have a higher level of diversification to those further away. We will explore using categorical dummies and distance from the highest flood prone areas as variables in our model. Baseline data will be used to estimate this.

## Methodology – Estimating changes in risk preferences with or without flood risk.

The impact of the changes in agricultural production as a result of the structural measures to be implemented on farmers' risk attitudes in Georgia is ambiguous. While the loss of crops due to flooding will lead to avoided losses, the response to the change in risk by farmers is ambiguous a priori.

We will estimate the effect of structural measures on risk attitudes, production and land allocation. The methodology will apply the model similar to Kumbhakar and Tveteras (2003) and Koundouri (2009) that did not make a priori assumptions on the form of risk preferences. The risk preference function will be estimated simultaneously with the production technology and land allocation equations. The estimable risk preference function is flexible enough to allow for different types of risk attitudes, e.g. increasing, constant or decreasing absolute risk aversion. The benefit of this methodology is that we can evaluate how risk aversion changes across farms and over time specially to assess the impact of an investment like the structural measures. In general, we expect that flood has had a strong impact on income, farm structure and crop mix which can be partially explained by changes in risk attitudes.

Farmers may face several types of risk but, in general, producers of field crops are found to be more concerned about yield and price variability than about other categories of risk (USDA, 2004). Thus, we choose to focus on production risk, which is clearly the dominant source of risk in our case. The project is not doing anything to change the price risk and should remain the same.

The usual way of accounting for production risk is to assume a Just-Pope (1978, 1979) form for the technology:

$$y = f(x, A; z) + g(x, A)e,$$

where in our case y represents aggregate grain production,  $f(x, A; z)$  is the mean production function and  $g(x, A)$  the production risk function. Vector x includes three variable inputs, namely fertilizer, labor (which corresponds to total working hours in crop production, including both hired labor and family labor) and plant protection, as well

<sup>16</sup> [https://en.wikipedia.org/wiki/Agricultural\\_diversification](https://en.wikipedia.org/wiki/Agricultural_diversification)

as one fixed capital input (defined as the total value of fixed assets on the farm). Vector  $A$  represents land allocations (for wheat and barley) that enter both the mean function and the risk function. Vector  $z$  includes exogenous variables which control for heterogeneity across farms and which are assumed to enter the mean production function only. The random term  $e$  represents a weather shock that may affect output, exogenous to farmer's action, with  $E(e) = 0$  and  $V(e) = 1$  (Just and Pope, 1978, 1979). The risk function  $g(x, A)$  is flexible with respect to the impact of inputs on risk (i.e. each input can either have no effect, decrease or increase production risk). By assumption, farmers maximize the expected utility of profit under the constraint that the total land is fixed. This assumption can be relaxed to take into consideration the possibility of land area been increase under the project.

## Methodology 3 – Measuring the impact of information campaign

One way of measuring both uncertainty and perception of risk is to design a formal structure for modeling nonfinancial uncertain risks elicited in a survey or experimental setting. These methods will combine elements of decision weighting and random utility. The resulting model allows one to study the relationship between changes in expected mortality risk and/or uncertainty surrounding those risks and standard welfare estimates such as willingness to pay or willingness to accept. As constructed, the model generates welfare values for mitigating or increasing risk and uncertainty. One advantage of this approach is that it entails estimating a risk distribution that can vary with exposure, demographic characteristics, or other influences such as information about the topic.

With this approach, we can model impact of risk-reduction and risk-education programs. To date, virtually all cost-benefit analyses are based exclusively on the value of reducing the average risk, and thereby fail to include the benefits that could be captured by reducing uncertainty as well. This model allows the practitioner to examine both effects and should therefore give insight into appropriate risk management policies.

Other potential benefits of these approaches are that we can measure the impact of information campaigns and if they reduce uncertainty and welfare costs of risk- mitigation programs. In fact, subjects that are exposed to conflicting risk information or that perceived to be from unreliable sources may report more uncertainty than those who have heard little about climate risks.

### **Sampling and scope of data collection:**

Primary data will need to be collected in different flood areas of Georgia with agricultural land. Sampling will be stratified by level of vulnerability to flood – for example - chronically flood prone, occasionally flood prone and areas that are flood free. Within each category, farmers or municipalities will be randomly selected (if randomization is at the municipality level, all the farmers within the municipality can be selected or a percentage of them depending on the population). This will be informed based on assessment of farmers by flood level. The flood free areas will be mapped based on spatial distance to the chronically and occasionally flood prone areas.



## ***Cost-benefit analysis and Intervention Action Plan of flood mitigation measures at 21 targeted sites***

### **1 Preamble**

This analysis follows on from the August 2016 report *“Upscaling of Rioni Flood Damages to all Georgian Flood Plains and an overview of the Impacts on Population, Property and Agriculture within Georgia from Other Hydro meteorological hazards”*.

The latter report identified Regions and Municipalities where risk from Hydro meteorological hazards were greatest and precipitated the site specific work by UNDP and NEA to target sites in West and East Georgia where mitigation work could alleviate the effects of flooding and mudslides.

Some 21 sites were subjected to preliminary engineering investigation<sup>17</sup> and the broad costs of mitigation work quantified. 9 sites were investigated in West Georgia, largely flood mitigation in the Rioni catchment and 12 sites in Eastern Georgia associated with sediment extraction to mitigate the deleterious effects of mud slides and also flood mitigation. Fig 1 illustrates the locations of each site and Table 1 summarises the capital cost of the work required. Total estimated costs are USD 12,730,000 of which USD 7,880,000 are identified in East Georgia and USD 4,850,000 in West Georgia.

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<sup>17</sup> As part of the GCF project more technically detailed investigations, based on detailed flood hazard and risk modelling and applying best-practice, appraisal led engineering design techniques, will be undertaken to fully developed the engineering interventions

	<b>MITIGATION MEASURES</b>	<b>Estimated</b>
#	West Georgia    East Georgia	<b>Capital Cost (USD)</b>
1	Rioni river, left bank – Sajavakho: embankment with length 700 m	550,000
2	Rioni river, right bank – Sagvichio: embankment with length 2000 m.	750,000
3	Rioni river, left bank – Gaghma Kodori: embankment with length 550 m.	300,000
4	Rioni river, left bank – Narionali: embankment with length 1550 m.	1,000,000
5	Rioni river, left bank – Patara Poti: embankment with length 2000 m.	700,000
6	Rioni river, right bank – Siriachkoni: embankment with length 1000 m.	350,000
7	Tskhenistskali river, left bank – Siriachkoni: embankment with length 500 m.	300,000
8	Rioni river, left bank – Vazisubani: embankment with length 900 m.	550,000
9	Achkva river – Kobuleti: Construction of channel with length 2000 m,	350,000
10	Duruji river (frequent mudflow) – sediment extraction (14 km).	1,500,000
11	Kabali river (frequent mudflow) – sediment extraction (20 km).	1,000,000
12	Khodashniskhevi river – sediment extraction (5 km) and gabion construction	1,800,000
13	Telaviskhevi river – sediment extraction (4,5 km).	800,000
14	Alazani river, right bank – Samtatskaro: embankment with length 300 m.	530,000
16	Alazani river, right bank – Milari: embankment with length 350 m.	400,000
17	Alazani river, right bank – Milari: embankment with length 370 m.	400,000
18	Lagodekhiskhevi river, right bank – Lagodekhi: embankment with length 3,7 km.	400,000
19	Debeda river, left bank – Kirovka: embankment with length 800 m.	150,000
20	Debeda river, left bank – Kirovka: embankment with length 800 m.	100,000
21	Liakhvi river, left bank – Gori city: embankment with length 1600 m.	800,000
	<b>TOTAL</b>	<b>12,730,000</b>
	East Georgia estimated costs	<b>7,880,000</b>
	West Georgia estimated costs	<b>4,850,000</b>

The Terms of Reference for this report are:

- Identify areas of benefit and number of beneficiaries for each proposed intervention measure (21 sites)
- Calculate damage saving (no. of properties and agricultural damages) for each location
- Calculate NPV for each structural measure
- Calculate cost-benefit ratios
- Based on analysis develop a prioritized list of intervention measures and a risk management structural Intervention Action Plan

## 2 Benefit Cost analysis for each project

The “Upscaling” report was based on GIS modelling of spatial economic damages associated with hydro meteorological hazards. The data was extracted from the model with assumptions as follows:

- Property, people currently at low, medium and high risk based on “Report on “MATRA” project of National Flood Susceptibility Map of Georgia, University of Twente, The Netherlands, 2011”
- Annual Average expected flood damage to property from the upscaling model
- Annual Average expected flood damage to agricultural land taking the mean annual loss per hectare from the upscaling model for the Regions where mitigation work is proposed (Samegrelo, Imereti and Kakheti)

- Mitigation work will eliminate 90% of expected annual damages<sup>18</sup>
- Where mitigation of mudflows is anticipated as a result of expedient sediment extraction then benefits will accrue to all property within a defined buffer from the river; benefits will be the estimated value of property as mudflows will either destroy the property or make property uninhabitable
- Extent of agricultural land protected is particularly conjectural from desk studies and the cash flow results (see below) are given with and without agricultural benefits
- In the large urban areas e.g. Gori and Poti the extraction of property at risk from the Dutch model may overestimate the true risk

Cash flows for each location were derived (accompanying Excel spreadsheet) giving:

- Numbers of Property benefiting for each risk zone
- Numbers of people benefiting for each risk zone
- Approximate total areas of agricultural land benefiting
- Present Value of Capital and Maintenance costs<sup>19</sup>
- Present Value of Benefits (or damages avoided)
- Net Present Value of each site (NPV) = (PVb – PVc)
- Benefit Cost Ratio (BCR) = (PVb/PVc)

As costs and benefits accrue at different times over the assumed 50 years' life of mitigation the Present Value of these costs and benefits reflects the opportunity costs of capital and multiplies the actual costs and benefits by a discount factor derived using the current Central Bank of Georgia discount rate of 3.75%. Where NPV is positive or BCR greater than unity then a scheme is deemed viable.

Setting political, environmental and technical considerations aside scheme implementation priority in the development of an Action Plan may be evaluated using a number of criteria:

1. Highest NPV
2. Highest BCR
3. Greatest number of properties benefiting
4. Greatest number of people benefiting
5. Greatest area of agricultural land protected
6. Combinations of these

For simplicity each of the targeted 21 sites was ranked for the first 5 criteria and ranks added. The greater the combined ranking the greater the benefits of the project. In this way an Action Plan was derived to allow prioritisation of mitigation activity where funding is limited.

Table 2 identifies scheme prioritisation assuming benefits to property and agriculture and Table 3 identifies scheme prioritisation assuming benefits to properties only.

Assumptions specific to each site and orthophoto maps of the benefit areas are given at the end of the report. Decision making on the Action Plan would further benefit from field reconnaissance of the benefit areas and adjustments to input data in the model.

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<sup>18</sup> Based on author's experience; no mitigation works can prevent damage from all floods

<sup>19</sup> For expedience estimated at 10% of capital costs every 10 years

MITIGATION MEASURES																	
East Georgia West Georgia		Total Costs Top 9 projects	Estimated	NPV	NPV	BCR	BCR	Protected									
#		6,050,000	Capital Cost (USD)	GEL	Rank	Rank	Property	Property Rank	People	People Rank	Land (Ha)	Land Rank	Land Rank	Total Rank	Investment Priority		
3	Rioni river, left bank – Gaghma Kodori: embankment with length 550 m.		300,000	17,343,240	18	22.15	20	581	17	807	17	846	19	91	1		
2	Rioni river, right bank – Sagvichio: embankment with length 2000 m.		750,000	18,288,676	19	9.92	17	261	15	372	15	877	20	86	2		
21	Liakhvi river, left bank – Gori city: embankment with length 1600 m.		800,000	32,399,529	20	15.82	19	492	16	1994	19	0	1	75	3		
18	Lagodekhiskhevi river, right bank – Lagodekhi: embankment with length 3,7 km.		400,000	14,429,686	17	14.20	18	775	20	775	16	0	1	72	4		
9	Achkva river – Kobuleti: Construction of channel with length 2000 m,		350,000	3,896,354	15	5.07	16	675	19	2297	20	0	1	71	5		
12	Khodashniskhevi river – sediment extraction (5 km) and gabion construction		1,800,000	6,983,536	16	2.42	13	647	18	842	18	0	1	66	6		
6	Rioni river, right bank – Siriachkoni: embankment with length 1000 m.		350,000	2,507,610	14	3.62	15	4	7	3	8	213	17	61	7		
4	Rioni river, left bank – Naronali: embankment with length 1550 m.		1,000,000	688,680	10	1.25	9	37	11	30	11	201	16	57	8		
7	Tskhenistskali river, left bank – Siriachkoni: embankment with length 500 m.		300,000	570,253	9	1.70	11	13	9	10	10	60	14	53	9		
8	Rioni river, left bank – Vazisubani: embankment with length 900 m.		550,000	526,510	6	0.65	8	31	10	49	12	48	13	49	10		
5	Rioni river, left bank – Patara Poti: embankment with length 2000 m.		700,000	2,433,727	13	2.27	12	0	1	0	1	257	18	45	11		
17	Alazani river, right bank – Milari: embankment with length 370 m.		400,000	1,943,820	12	2.78	14	0	1	0	1	100	15	43	12		
1	Rioni river, left bank – Sajavakho: embankment with length 700 m		550,000	1,151,300	3	0.23	5	139	14	213	14	0	1	37	13		
13	Telaviskhevi river – sediment extraction (4,5 km).		800,000	832,994	11	1.38	10	109	13	0	1	0	1	36	14		
11	Kabali river (frequent mudflow) – sediment extraction (20 km).		1,000,000	1,348,258	2	0.51	6	50	12	100	13	0	1	34	15		
14	Alazani river, right bank – Samtatskaro: embankment with length 300 m.		530,000	560,416	5	0.61	7	0	1	0	1	28	12	26	16		
10	Duruji river (frequent mudflow) – sediment extraction (14 km).		1,500,000	3,989,396	1	0.03	4	4	7	6	9	0	1	22	17		
20	Debeda river, left bank – Kirovka: embankment with length 800 m.		100,000	273,348	8	-	1	0	1	0	1	0	1	12	18		
19	Debeda river, left bank – Kirovka: embankment with length 800 m.		150,000	410,021	7	-	1	0	1	0	1	0	1	11	19		
16	Alazani river, right bank – Milari: embankment with length 350 m.		400,000	1,093,390	4	-	1	0	1	0	1	0	1	8	20		
TOTAL			12,730,000					3,818		7,498		2,630					
East Georgia estimated costs			6,680,000														
West Georgia estimated costs			6,050,000														

NOTE : Sites 14 and 15 are combined in 14

Table 2: Investment Priority assuming property and land is included in the Cash Flows

MITIGATION MEASURES																	
East Georgia West Georgia		Total Costs Top 9 projects	Estimated	NPV	NPV	BCR	BCR	Protected									
#		6,050,000	Capital Cost (USD)	GEL	Rank	Rank	Property	Property Rank	People	People Rank	Land (Ha)	Land Rank	Land Rank	Total Rank	Investment Priority		
21	Liakhvi river, left bank – Gori city: embankment with length 1600 m.		800,000	32,399,529	20	15.82	20	492	16	1994	19	0	1	76	1		
18	Lagodekhiskhevi river, right bank – Lagodekhi: embankment with length 3,7 km.		400,000	14,429,686	19	14.20	19	775	20	775	16	0	1	75	2		
9	Achkva river – Kobuleti: Construction of channel with length 2000 m,		350,000	3,896,354	17	5.07	17	675	19	2297	20	0	1	74	3		
12	Khodashniskhevi river – sediment extraction (5 km) and gabion construction		1,800,000	6,983,536	18	2.42	15	647	18	842	18	0	1	70	4		
3	Rioni river, left bank – Gaghma Kodori: embankment with length 550 m.		300,000	3,645,752	16	5.45	18	581	17	807	17	0	1	69	5		
2	Rioni river, right bank – Sagvichio: embankment with length 2000 m.		750,000	3,456,343	15	2.70	16	261	15	372	15	0	1	62	6		
1	Rioni river, left bank – Sajavakho: embankment with length 700 m		550,000	1,151,300	5	0.23	9	139	14	213	14	0	1	43	7		
13	Telaviskhevi river – sediment extraction (4,5 km).		800,000	832,994	13	1.38	13	109	13	0	1	0	1	41	8		
7	Tskhenistskali river, left bank – Siriachkoni: embankment with length 500 m.		300,000	401,200	10	0.51	11	13	9	10	10	0	1	41	8		
11	Kabali river (frequent mudflow) – sediment extraction (20 km).		1,000,000	1,348,258	4	0.51	10	50	12	100	13	0	1	40	10		
8	Rioni river, left bank – Vazisubani: embankment with length 900 m.		550,000	1,380,367	3	0.08	8	31	10	49	12	0	1	34	11		
4	Rioni river, left bank – Naronali: embankment with length 1550 m.		1,000,000	2,565,688	2	0.06	7	37	11	30	11	0	1	32	12		
5	Rioni river, left bank – Patara Poti: embankment with length 2000 m.		700,000	2,433,727	14	2.27	14	0	1	0	1	0	1	31	13		
6	Rioni river, right bank – Siriachkoni: embankment with length 1000 m.		350,000	941,048	7	0.02	5	4	7	3	8	0	1	28	14		
10	Duruji river (frequent mudflow) – sediment extraction (14 km).		1,500,000	3,989,396	1	0.03	6	4	7	6	9	0	1	24	15		
14	Alazani river, right bank – Samtatskaro: embankment with length 300 m.		530,000	560,416	8	0.61	12	0	1	0	1	0	1	23	16		
17	Alazani river, right bank – Milari: embankment with length 370 m.		400,000	-	12	-	1	0	1	0	1	0	1	16	17		
20	Debeda river, left bank – Kirovka: embankment with length 800 m.		100,000	273,348	11	-	1	0	1	0	1	0	1	15	18		
19	Debeda river, left bank – Kirovka: embankment with length 800 m.		150,000	410,021	9	-	1	0	1	0	1	0	1	13	19		
16	Alazani river, right bank – Milari: embankment with length 350 m.		400,000	1,093,390	6	-	1	0	1	0	1	0	1	10	20		
TOTAL			12,730,000					3,818		7,498		-					
East Georgia estimated costs			6,680,000														
West Georgia estimated costs			6,050,000														

NOTE : Sites 14 and 15 are combined in 14

Table 3: Investment Priority assuming property only is included in the Cash Flows

The top 9 ranked projects have a capital cost of USD 6.45 million if property only is included in the benefits. If Agriculture is added the top 9 projects have a capital cost of USD 6 million.

The ranking of the top nine sites for each scenario includes 7 of the same sites with. The headline results are summarised in Table 4:

Only properties included					Agriculture and Properties included			
Rank	Site #	Number Properties	Net Present	Benefit Cost	Site #	Ha Agriculture	Net Present	Benefit Cost

		Protected	Value (GEL million)	Ratio			Value (GE million)	Ratio
1	21	492	32.3	15	3	846	17.3	22
2	18	775	14.4	14	2	877	18.2	10
3	9	675	3.9	5	21	0	32,4	16
4	12	647	7.0	2	18	0	13.3	14
5	3	581	3.6	5	9	0	3.9	5
6	2	261	3.5	3	12	0	7.0	2
7	1	139	(-) 1.2	0.2	6	213	2.5	4
8	13	109	0.8	1	4	201	0.7	1
9	7	13	(-) 0.4	0.5	7	60	0.5	2

Table 4: Summary of benefits for top 9 projects with and without agricultural benefits

Whilst the accuracy of the NPV and BCR lies wholly with the correct selection of properties and land from a rapid desk survey it is our opinion that the ranking of sites for funding is in the correct order of priority. Only site 1, where 107 of the properties selected are at low flood risk, and site 7 are not cost beneficial.

**John Chatterton and Nick Arevadze (Idea Design Group)**

**Tbilisi, 22<sup>nd</sup> October 2016**

**Commentary on each site (with Orthophoto)**

**Site 1 Rioni river, left bank – Sajavakho: embankment with length 700 m**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	0	32	107	139
People at Risk	0	50	163	213
Agricultural Land at Risk (Ha)	0	0	0	0

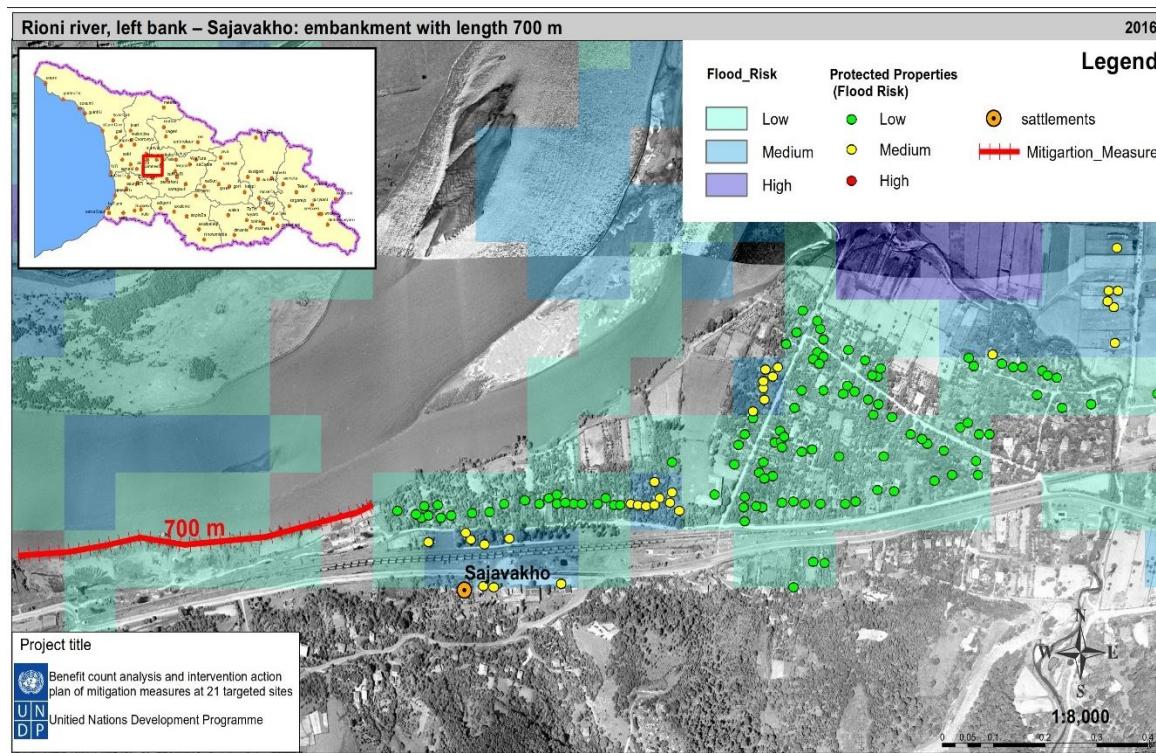
Not available

No data on agriculture available.  
Majority of properties are at low risk.  
Population low in rural areas with many abandoned properties

**Rank 7** when properties only included but negative NPV and very low BCR.

**Rank 13** overall

1,503,411 GEL	352,112 GEL
Total PVc	Total PVb
Net Present Value (NPV)	- 1,151,300 GEL
Benefit Cost Ratio (BCR)	0.23



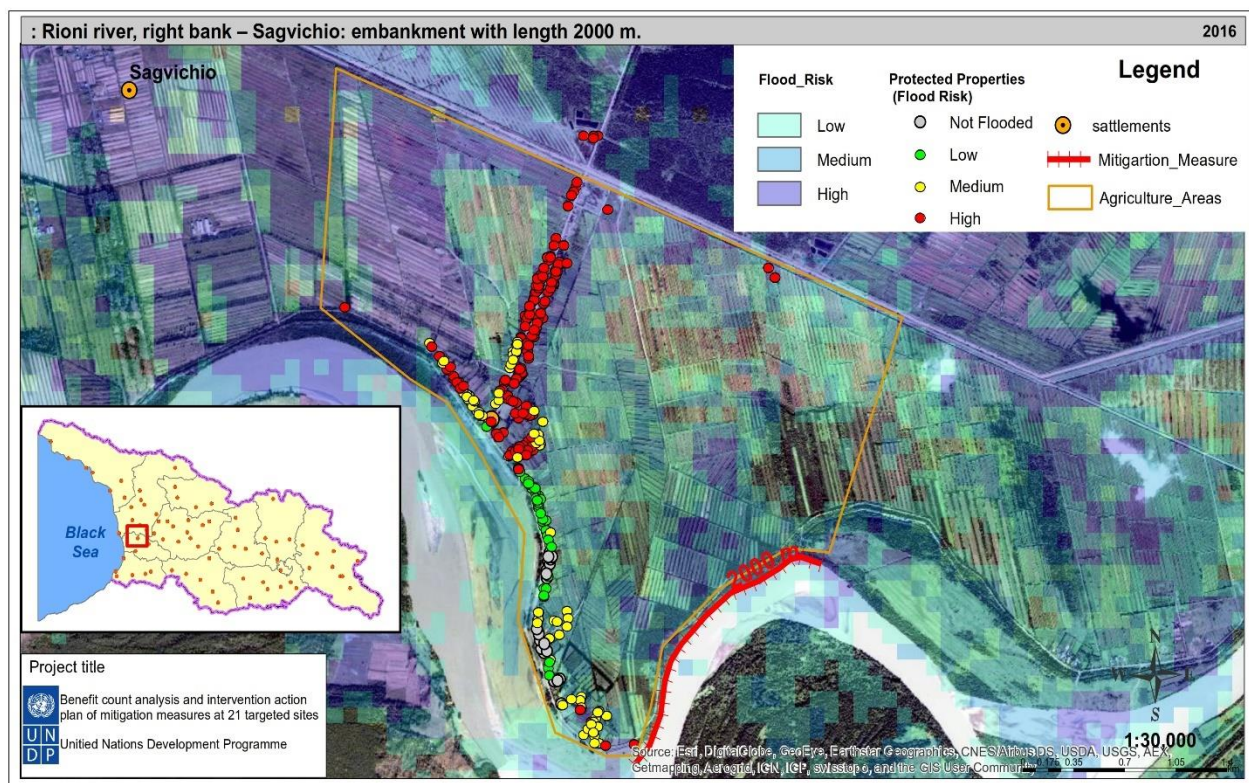


**Site 2: Rioni river, right bank – Sagvichio: embankment with length 2000 m.**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	150	75	36	261
People at Risk	225	93	54	372
Agricultural Land at Risk (Ha)				877

150 High Risk properties adjacent to river with a wide agricultural hinterland.  
**Rank 6** (properties Only) **Rank 2** when agricultural benefits included

2,050,107 GEL	5,506,450 GEL	20,338,782 GEL
Total PVC	Property PVb	Total PVb
Net Present Value (NPV)	3,456,343 GEL	18,288,676 GEL
Benefit Cost Ratio (BCR)	2.7	9.9

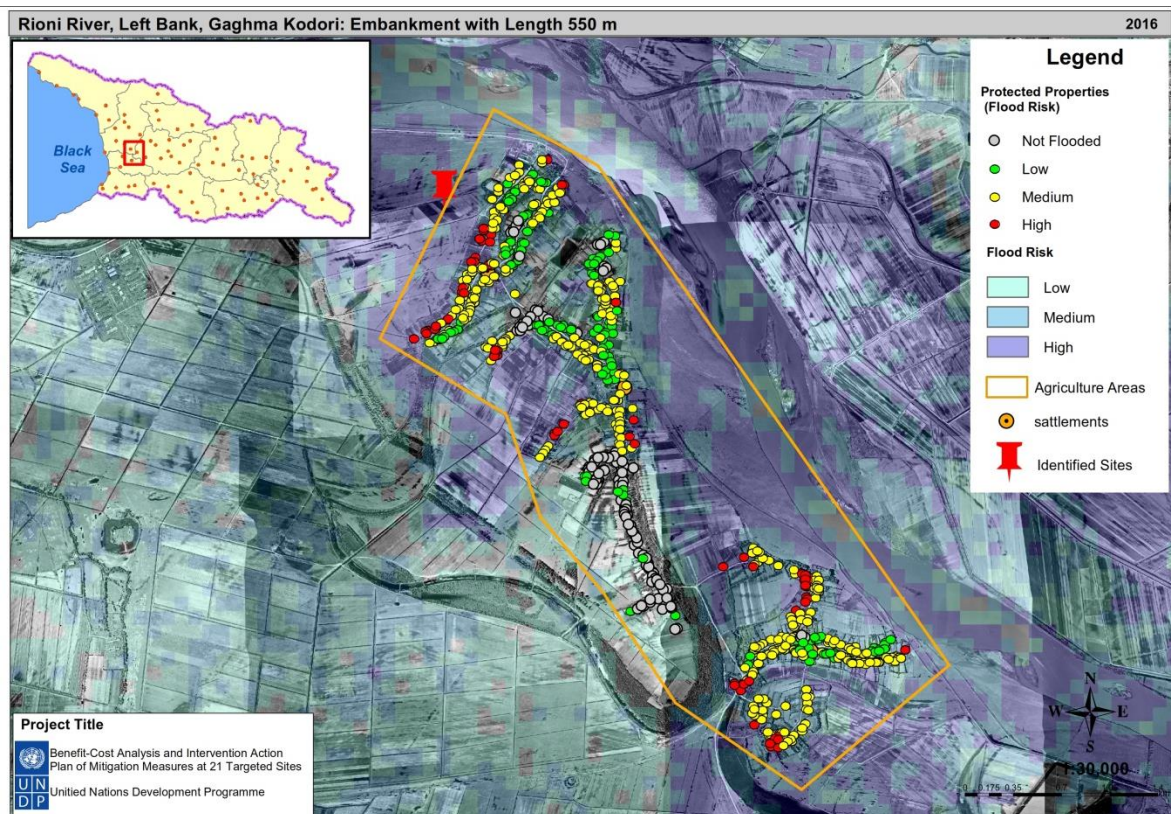


820,043 GEL	4,465,795 GEL	18,163,282 GEL
Total PVc	Property PVb	Total PVb
Net Present Value (NPV)	3,645,752 GEL	17,343,240 GEL
Benefit Cost Ratio (BCR)	5.4	22.1

**Site 3: Rioni river, left bank, Gaghma Kodori: embankment with length 550 m**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	71	364	146	581
People at Risk	102	506	199	807
Agricultural Land at Risk (Ha)				846

Significant population adjacent to Rioni with large potential agricultural hinterland at risk. **Rank 5** for properties only and **Rank 1** when agriculture is included

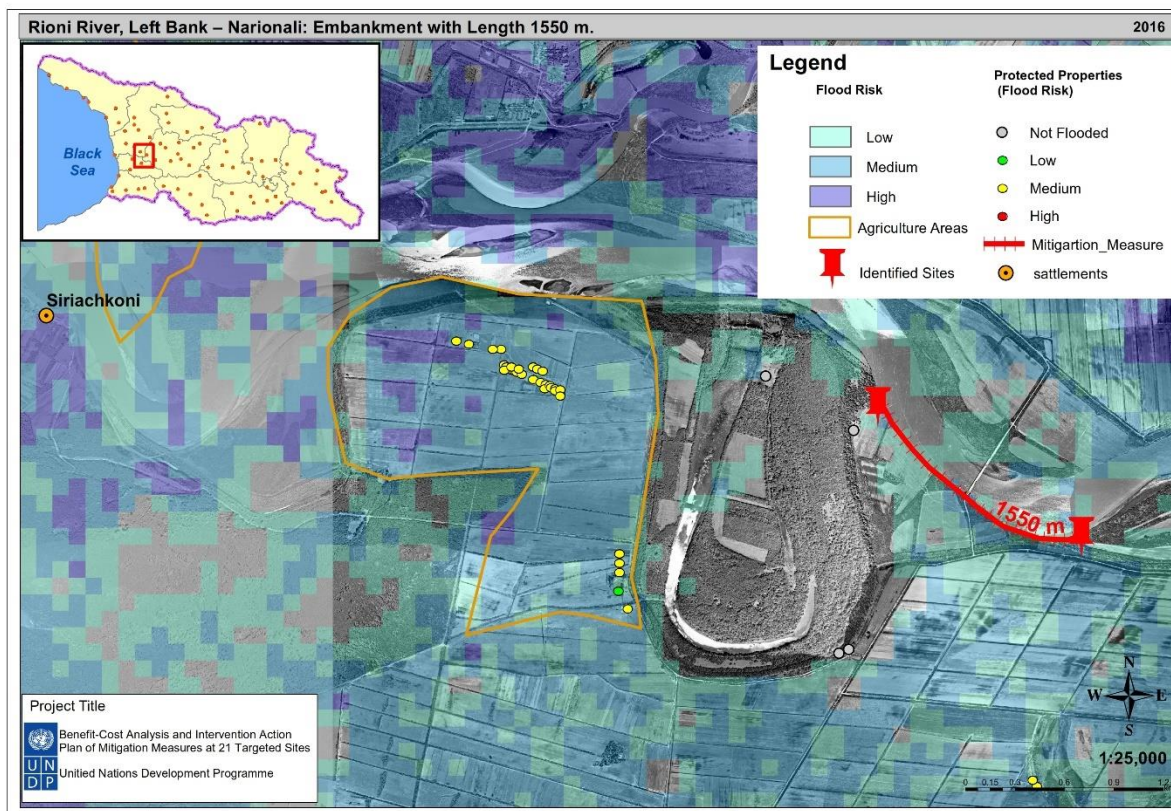




**Site 4:Rioni river, left bank – Narionali: embankment with length 1550 m.**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	0	33	4	37
People at Risk	0	25	5	30
Agricultural Land at Risk (Ha)				201

Largely medium risk properties and surrounding agricultural land adjacent to Rioni. <b>Rank 8</b> overall and <b>Rank 12</b> when only properties are included	2,733,475 GEL	167,788 GEL	3,422,155 GEL
	Total PVC	Property PVb	Total PVb
	Net Present Value (NPV)	- 2,565,688 GEL	688,680 GEL
	Benefit Cost Ratio (BCR)	0.06	1.3

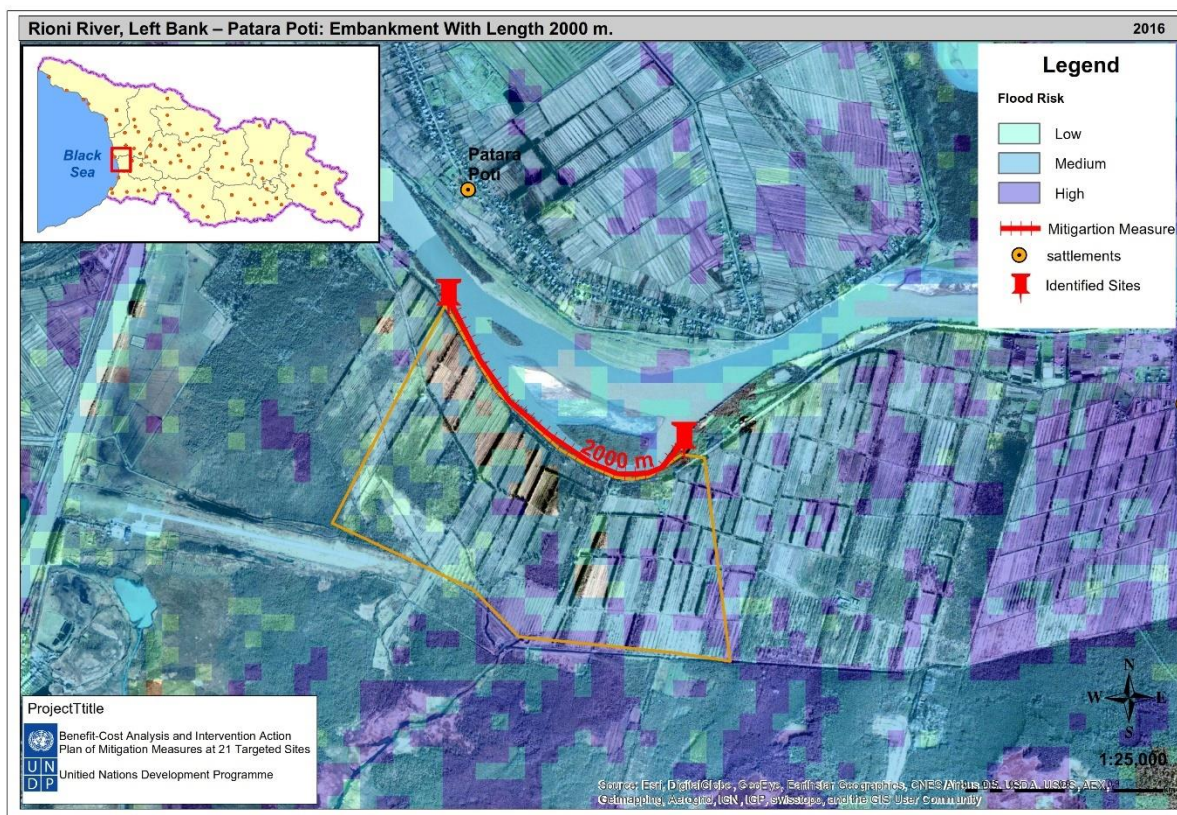


Site 5: Rioni river, left bank – Patara Poti: embankment with length 2000 m.

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	95	693	13	801
People at Risk	257	4,414	80	4,751
Agricultural Land at Risk (Ha)	0	0	0	0

The proposed site is not close to Poti with only agricultural land protected. **Rank 11** overall and **Rank 13** for property only.

1,913,433 GEL	4,347,159 GEL	4,247,159 GEL
Total PVC	PVb Agriculture	Total PVb
Net Present Value (NPV)	2,433,727 GEL	2,433,727 GEL
Benefit Cost Ratio (BCR)	2.3	2.3



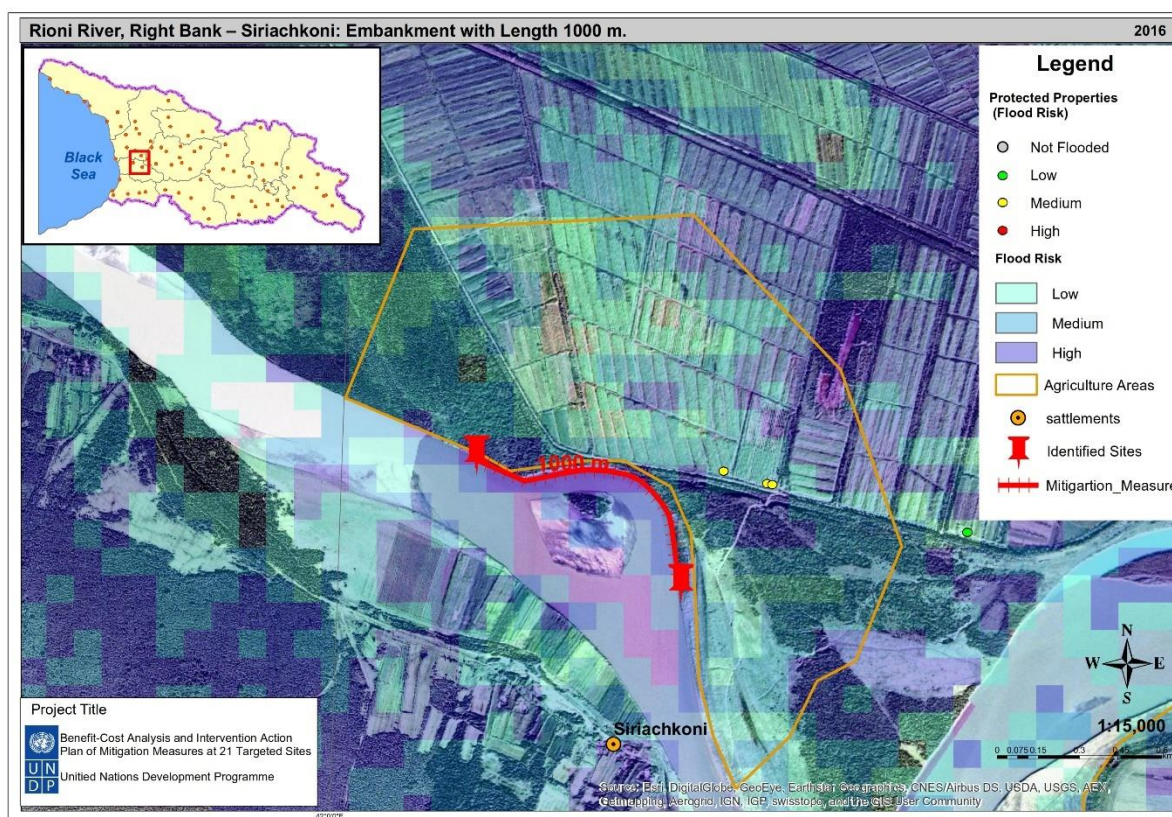
**Site 6: Rioni river, right bank – Siriachkoni: embankment with length 1000 m.**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	0	3	1	4
People at Risk	0	2	1	3
Agricultural Land at Risk (Ha)				213



Very few properties at risk with a rough estimate made of potential agricultural risk. **Rank 7** overall depending on agricultural hinterland. **Rank 14** when just property is included, but NPV hugely negative reflecting the small number of properties at risk

956,716 GEL	15,668 GEL	3,464,327 GEL
<b>Total PVc</b>	<b>Property PVd</b>	<b>Total PVb</b>
<b>Net Present Value (NPV)</b>	- 941,048 GEL	2,507,610
<b>Benefit Cost Ratio (BCR)</b>	0.02	3.6



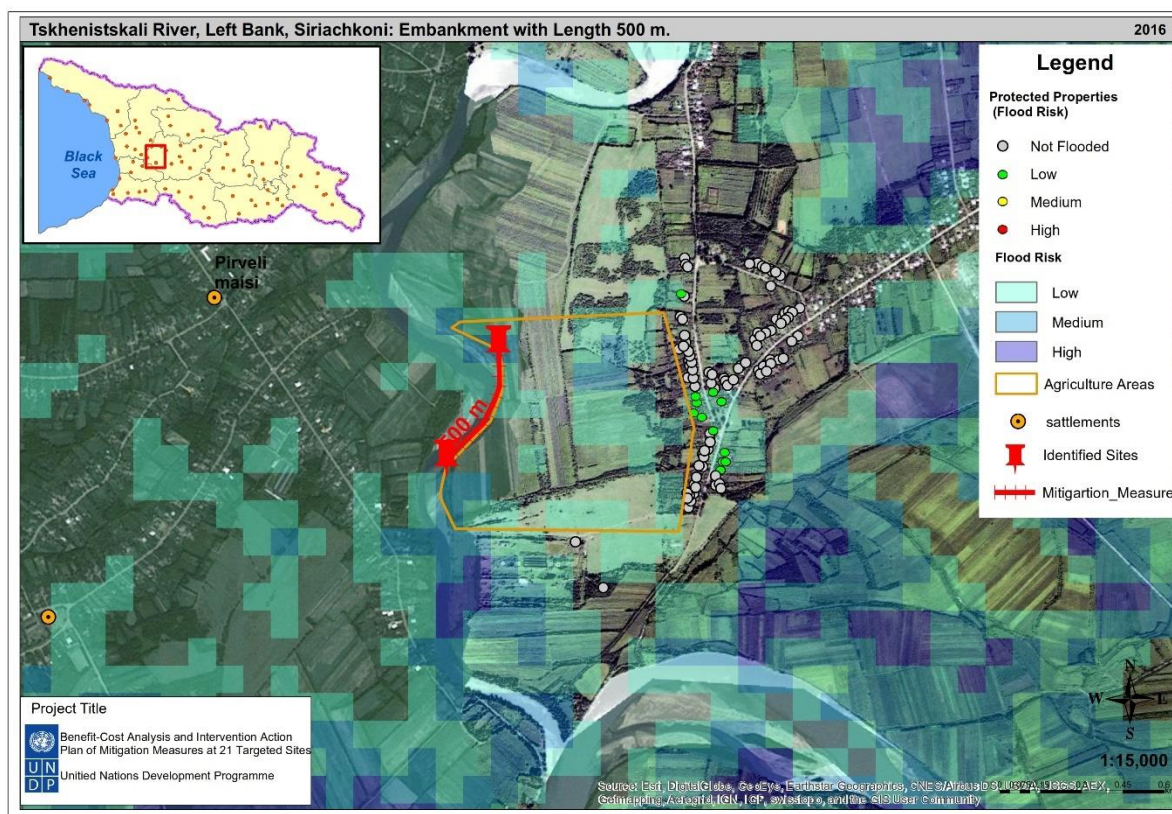
Site 7: Tskhenistskali river, left bank Siriachkoni: embankment, length 500 m.

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	0	0	13	13
People at Risk	0	0	10	10

Agricultural Land at Risk (Ha)				60
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A few low risk properties affected and a small area of agricultural land. Properties to the south are not included. **Rank 9** overall and **Rank 8** when only property are considered for each benefit scenario

820,043 GEL	418,843 GEL	1,390,296 GEL
<b>Total PVC</b>	<b>Property PVb</b>	<b>Total PVb</b>
<b>Net Present Value (NPV)</b>	- 401,200 GEL	570,253 GEL
<b>Benefit Cost Ratio (BCR)</b>	0.5	1.7



Site 8: Rioni river, left bank – Vazisubani: embankment with length 900 m.

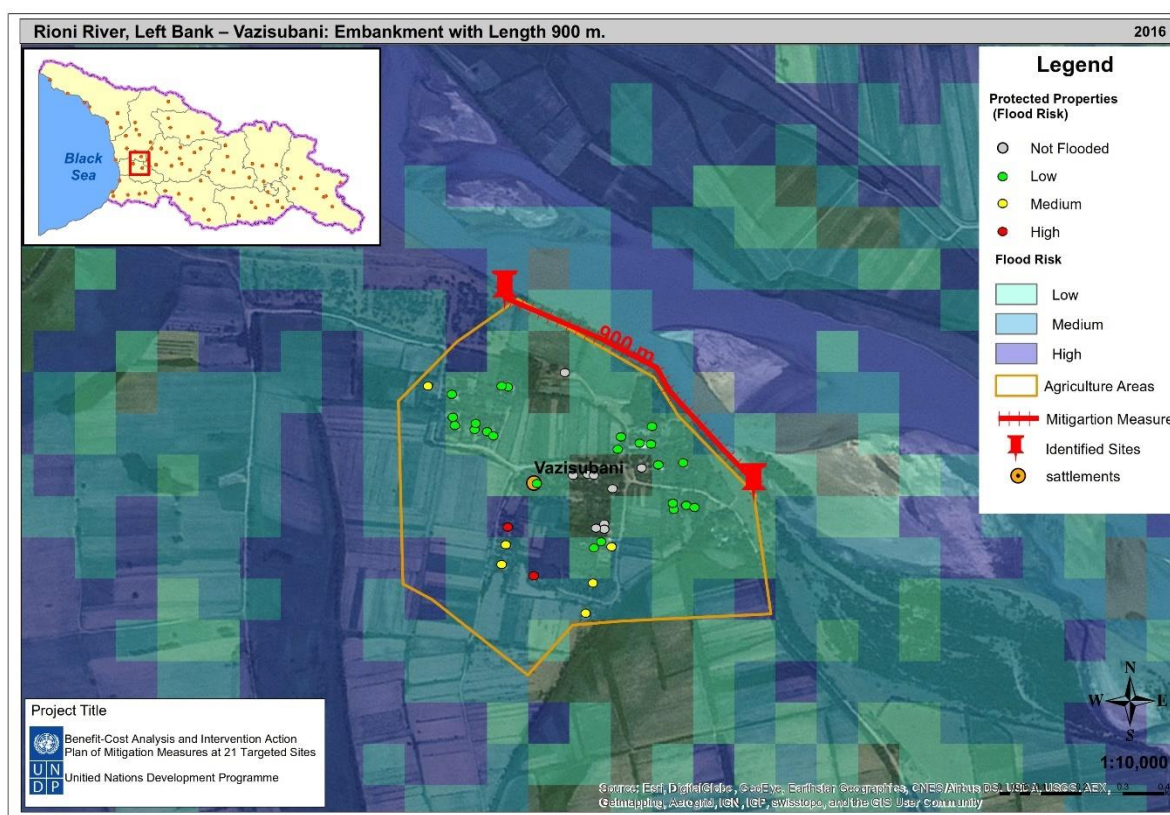
	High Risk	Medium Risk	Low Risk	Total
Property at Risk	2	6	23	31



People at Risk	4	10	35	<b>49</b>
Agricultural Land at Risk (Ha)				<b>48</b>

Most properties at low risk with limited agricultural benefit. **Rank 10** overall and **Rank 11** under properties only scenario. A large negative NPV irrespective of scenario

<b>1,503,411 GEL</b>	<b>123,044 GEL</b>	<b>976,902 GEL</b>
<b>Total PVc</b>	<b>Property PVb</b>	<b>Total PVb</b>
<b>Net Present Value (NPV)</b>	<b>- 1,380,367 GEL</b>	<b>- 526,510 GEL</b>
<b>Benefit Cost Ratio (BCR)</b>	<b>0.08</b>	<b>0.6</b>



**Site 9: Achkva river – Kobuleti: Construction of channel with length 2000 m, to protect Kobuleti city during flooding**

<b>High Risk</b>	<b>Medium Risk</b>	<b>Low Risk</b>	<b>Total</b>
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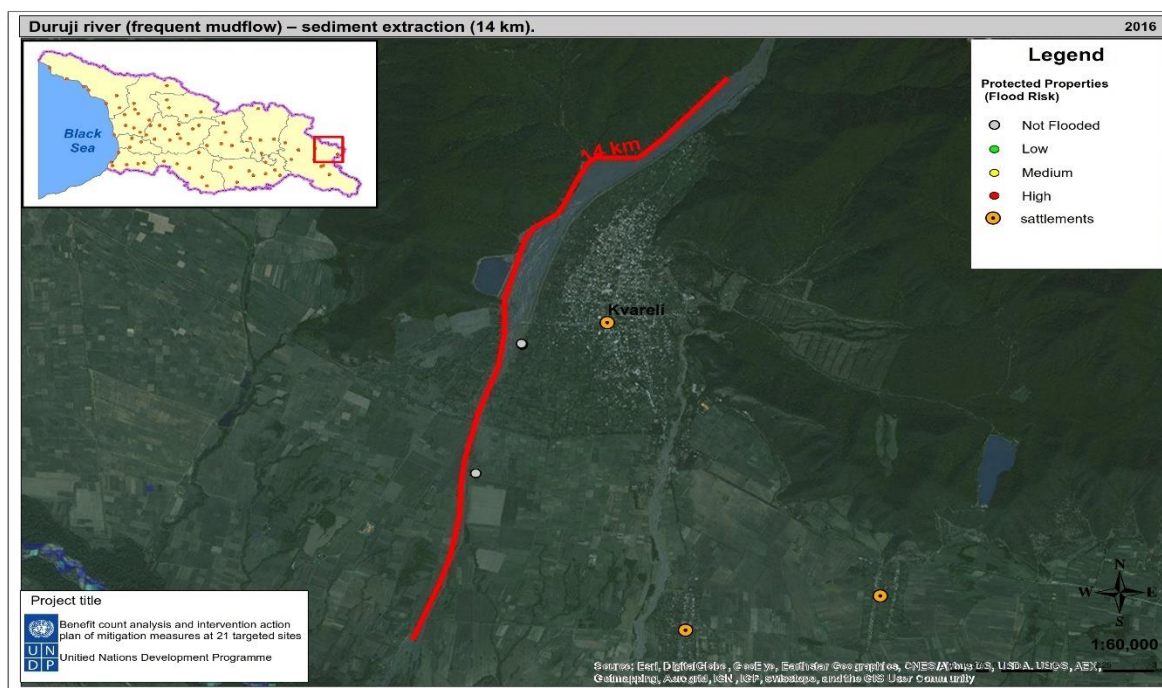


**Site 10: Duruji river (frequent mudflow) – sediment extraction (14 km).**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk				4
People at Risk				6
Agricultural Land at Risk (Ha)				0

There is no modelled flood plain from the Dutch model. Only 4 properties lie within the buffer either side of the river. It is assumed that mudflows would be detrimental to them either through destruction or abandonment. Probability of mudflows is assumed even through the years. The scheme is **Rank 17** overall and **Rank 15** when considering only property with very high negative NPV.

<b>4,100,213 GEL</b>	<b>110,817 GEL</b>	<b>110,817 GEL</b>
<b>Total PVC</b>	<b>Property PVb</b>	<b>Total PVb</b>
<b>Net Present Value (NPV)</b>	<b>- 3,989,396 GEL</b>	<b>- 3,989,396 GEL</b>
<b>Benefit Cost Ratio (BCR)</b>	<b>0.03</b>	<b>0.03</b>



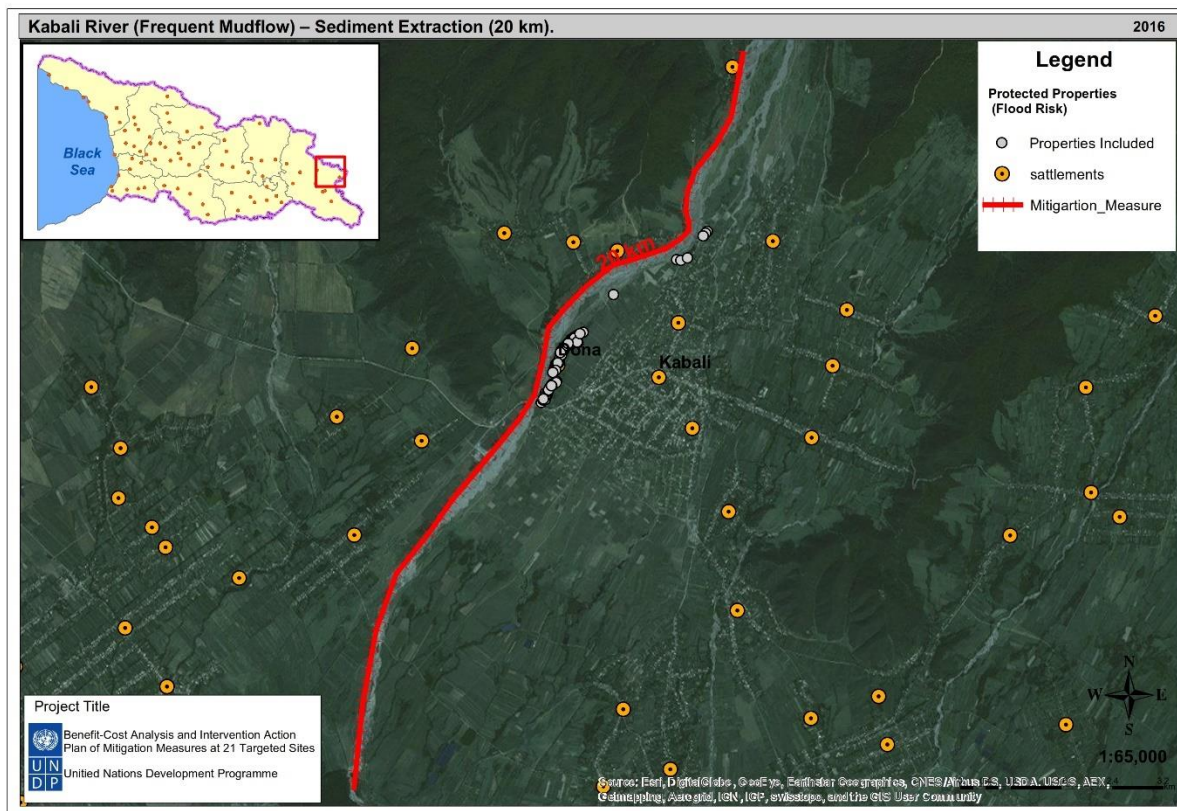


**Site 11: Kabali river (frequent mudflow) – sediment extraction (20 km).**

				High Risk	Medium Risk	Low Risk	Total
Property at Risk							50
People at Risk					100	estimated	
Agricultural Land at Risk (Ha)					0		

A buffer around the watercourse gives 50 properties, not allocated flood risk from the Dutch model. Benefits were derived as for Site 10. **Rank 15** overall and **Rank 10** for the property only scenario.

2,733,475 GEL	1,385,218 GEL	1,385,218 GEL
Total PVc	Property PVb	Total PVb
Net Present Value (NPV)	- 1,348,258 GEL	- 1,348,258 GEL
Benefit Cost Ratio (BCR)	0.5	0.5

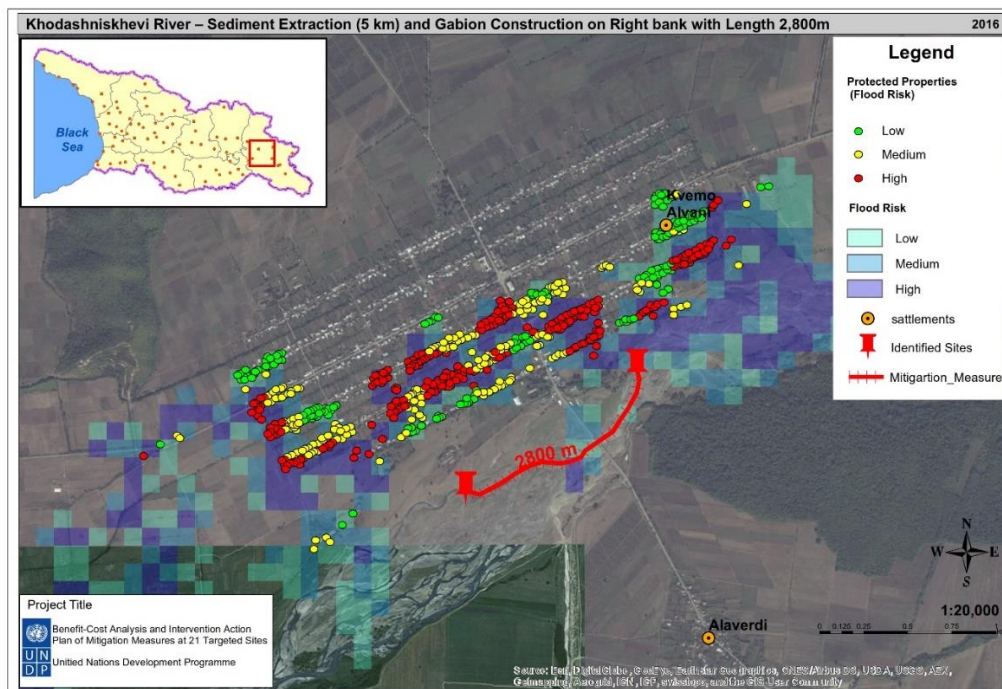


**Site12: Khodashniskhevi river – sediment extraction (5 km) and gabion construction on right bank with length 2,800m**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	265	213	169	647
People at Risk	337	278	227	842
Agricultural Land at Risk (Ha)				0

A large number of properties are at high risk from the Dutch model data resulting in a high NPV. The site is **Rank 6** overall and **Rank 4** when only properties are considered.

<b>4,920,256 GEL</b>	<b>11,903,791 GEL</b>	<b>11,903,791 GEL</b>
<b>Total PVc</b>	<b>Property Pvb</b>	<b>Total PVb</b>
<b>Net Present Value (NPV)</b>	<b>6,983,536 GEL</b>	<b>6,983,536 GEL</b>
<b>Benefit Cost Ratio (BCR)</b>	<b>2.4</b>	<b>2.4</b>

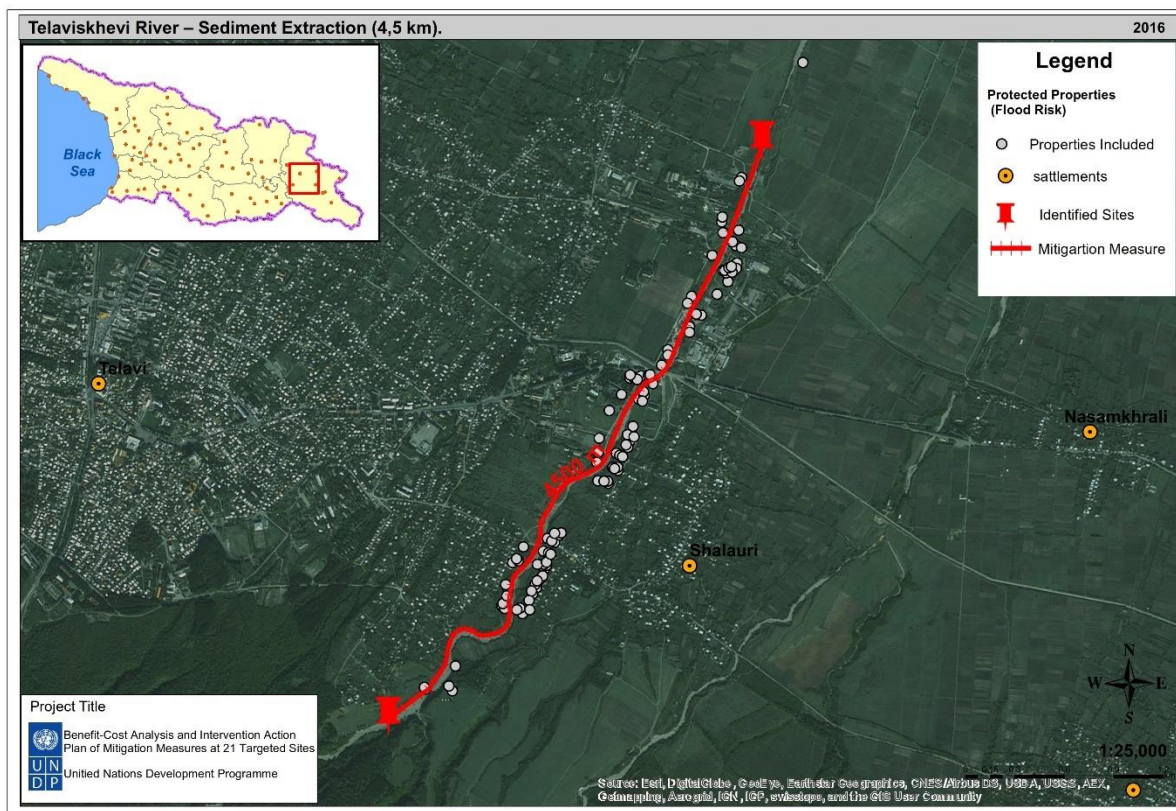


**Site 13: Telaviskhevi river – sediment extraction (4,5 km).**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk				109
People at Risk				0
Agricultural Land at Risk (Ha)				0

No property was within the Dutch flood risk zones so the method as for Sites 10 and 11 with some 109 properties in the buffer zone. The site is **Rank 15** overall and **Rank 8** when only property is considered. The generous NPV may reflect the width of the buffer zone applied

2,186,780 GEL	3,019,775 GEL	3,019,775 GEL
Total PVc	Property PVb	Total PVb
Net Present Value (NPV)	832,994 GEL	832,994 GEL
Benefit Cost Ratio (BCR)	1.4	1.4



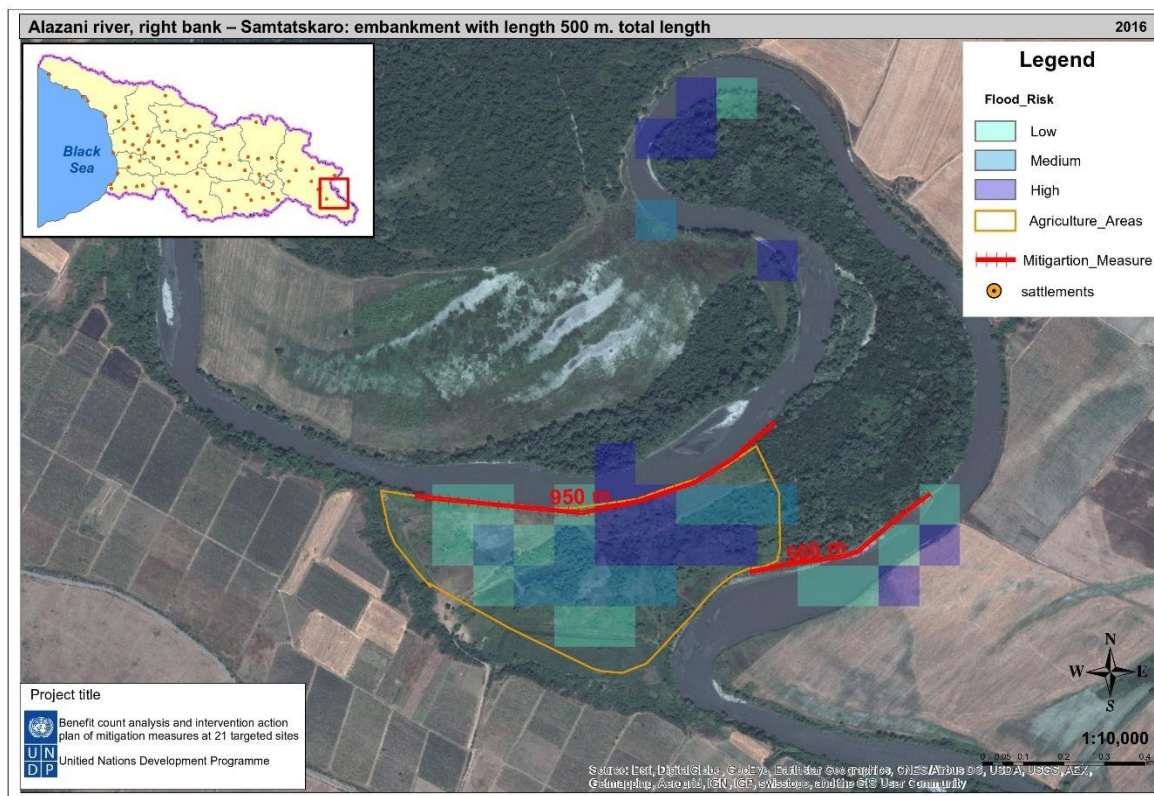


**Sites 14 and 15: Alazani river, right bank – Samtatskaro: embankment with length 500 m. total length**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk				0
People at Risk				0
Agricultural Land at Risk (Ha)				28

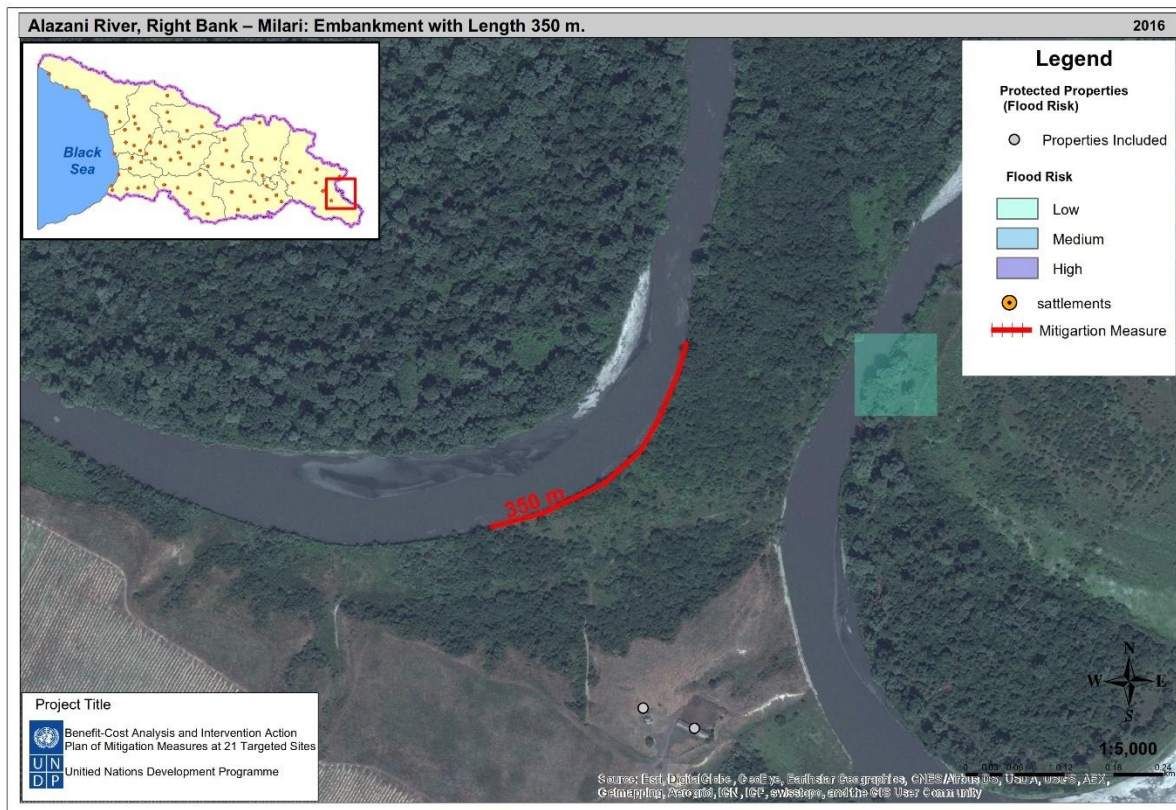
The benefit areas for the 2 sites were deemed very small and the 2 sites were combined. The sites were **Rank 16** overall and for the property only scenario.

1,448,742 GEL	888,326 GEL	888,326 GEL
Total PVC	Agric PVb	Total PVb
Net Present Value (NPV)	- 560,416 GEL	- 560,416 GEL
Benefit Cost Ratio (BCR)	0.6	0.6



**Site 16: Alazani river, right bank – Milari: embankment with length 350 m.**

The benefit areas for the site appeared negligible and although large property damages had been assigned by the upscaling model an ion on orthophotos indicated that the apparent commercial properties were no longer at the site which was derelict. The site is **Rank 20** overall and also **Rank 20** for the property only scenario.

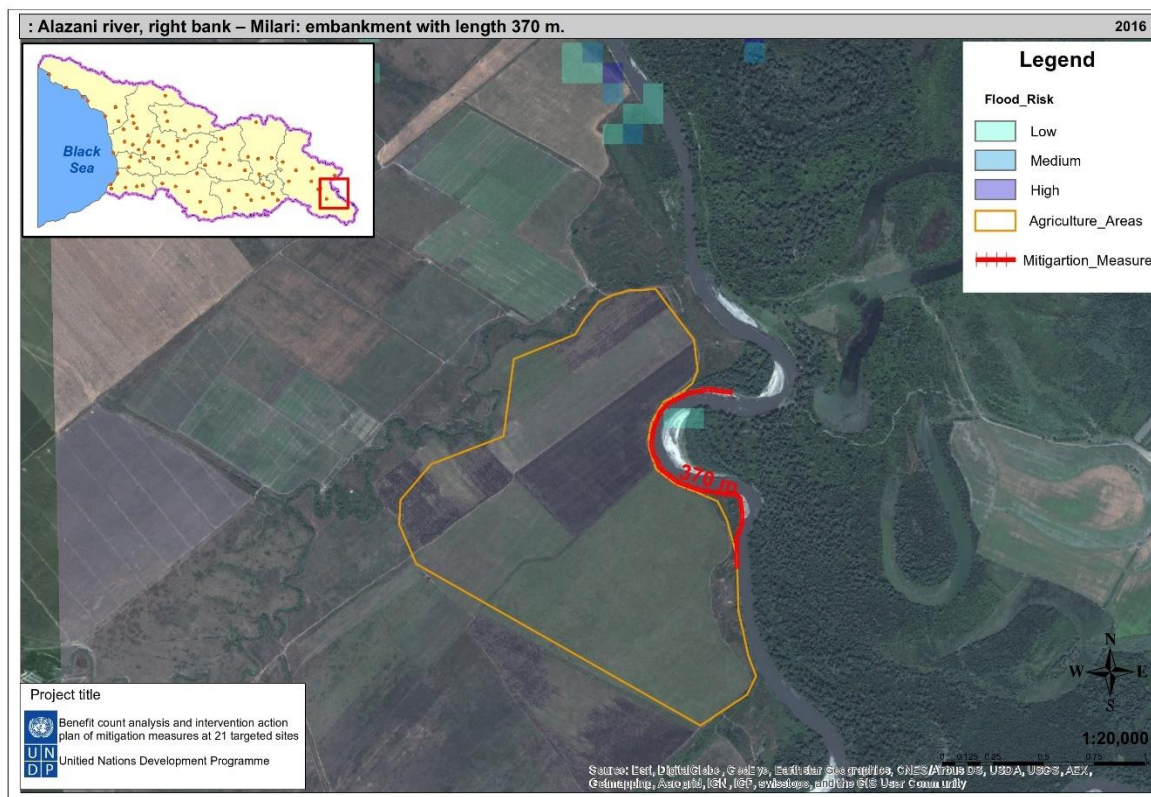


**Site 17: Alazani river, right bank – Milari: embankment with length 370 m.**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk				0
People at Risk				0
Agricultural Land at Risk (Ha)				100

This site protects agricultural land only and is **Rank 12** overall and **Rank 17** for the property only scenario.

1,093,390 GEL	3,037,211 GEL	3,037,211 GEL
Total PVc	Agric PVb	Total PVb
Net Present Value (NPV)	1,943,820 GEL	1,943,820 GEL
Benefit Cost Ratio (BCR)	2.8	2.8



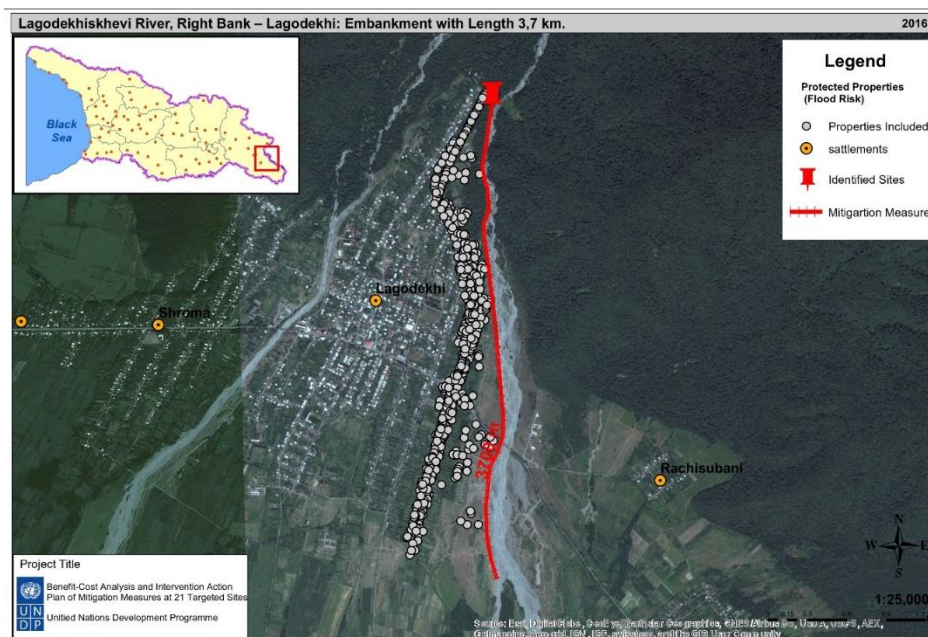


**Site 18: Lagodekhiskhevi river, right bank – Lagodekhi: embankment with length 3,7 km.**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk				523
People at Risk				775
Agricultural Land at Risk (Ha)				0

A large number of properties are close to the watercourse. Flood Risk data was deficient so the properties closest to the river were selected and annual average damage data applied to each. The high BCR and NPVs could reflect this crude approach and further investigation is required, Currently the site is **Rank 4** overall and **Rank 2** under the no property scenario

1,093,390 GEL	15,523,076 GEL	15,523,076 GEL
Total PVc	Property PVd	Total PVb
Net Present Value (NPV)	13,336,296 GEL	14,429,686 GEL
Benefit Cost Ratio (BCR)	14.2	14.2



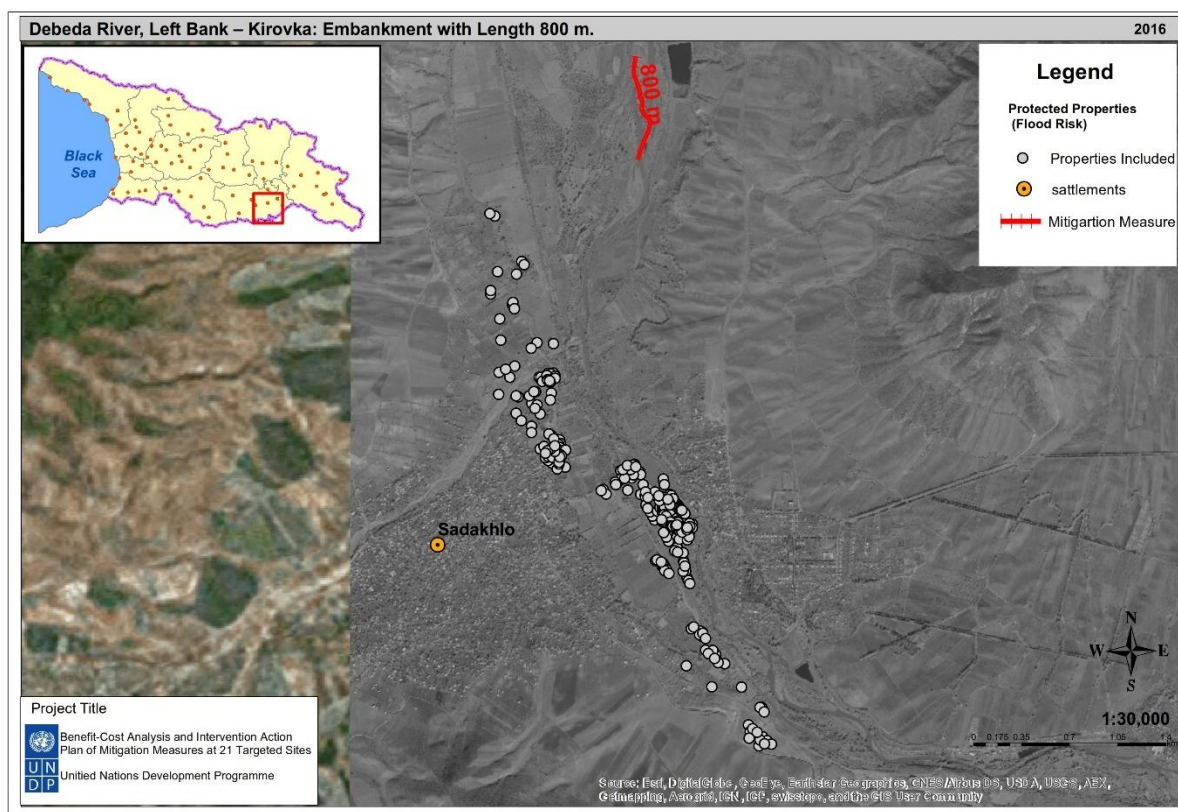


**Site 19: Debeda river, left bank – Kirovka: embankment with length 800 m.**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk				0
People at Risk				0
Agricultural Land at Risk (Ha)				0

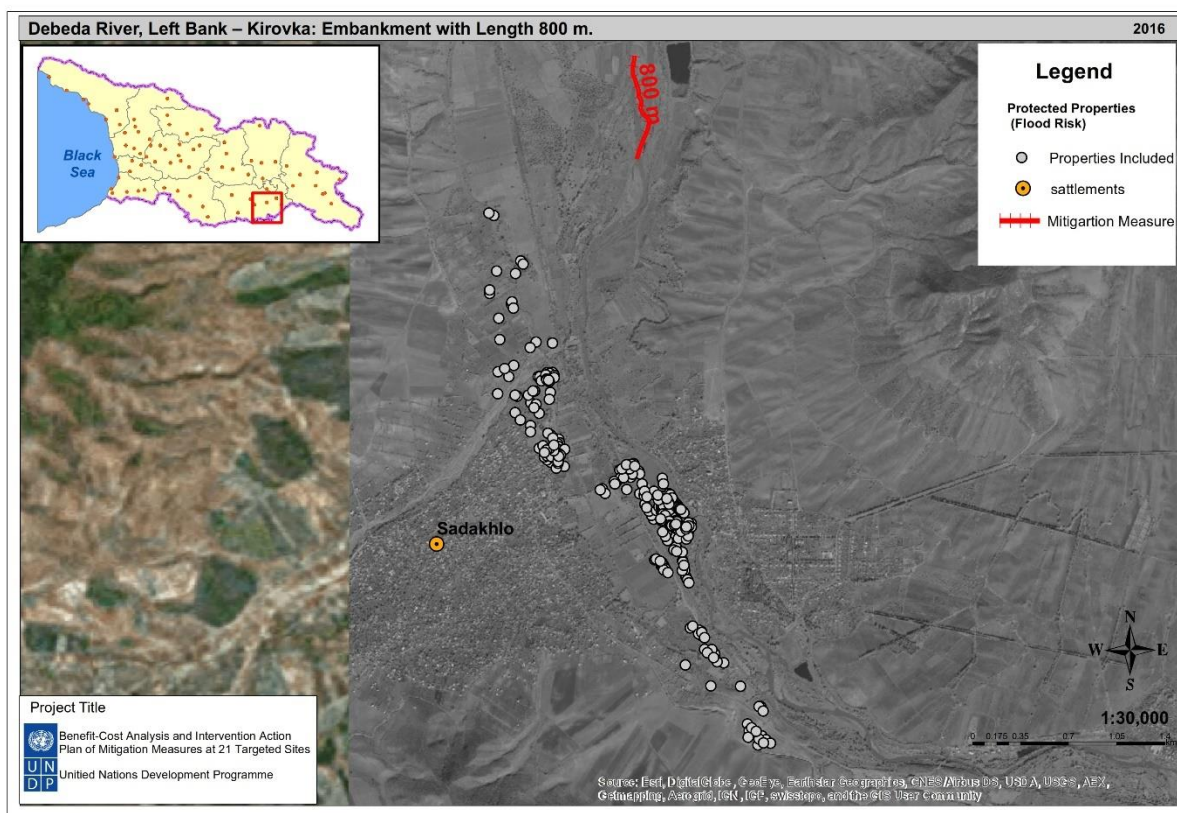
The proposed site is not close to any property. The site is **Rank 19** overall and also **Rank 19** for the only property scenario

<b>1,093,390 GEL</b>	<b>GEL</b>	<b>GEL</b>
<b>Total PVc</b>	<b>Property PVd</b>	<b>Total PVb</b>
<b>Net Present Value (NPV)</b>	<b>-1,093,390 GEL</b>	<b>-1,093,390 GEL</b>
<b>Benefit Cost Ratio (BCR)</b>		



**Site 20: Debeda river, left bank – Kirovka: embankment with length 800 m.**

It is uncertain where the site is and what the benefits might be. This site has not been properly analysed. It is **Rank 18** and **Rank 18** respectively. Its low cost raises the site above last ranking position.



**Site 21: Liakhvi river, left bank – Gori city: embankment with length 1600 m.**

	High Risk	Medium Risk	Low Risk	Total
Property at Risk	164	137	191	492
People at Risk	556	583	855	1994
Agricultural Land at Risk (Ha)				0

Significant properties and population are recorded in the low, medium and high risk flood plains from the Dutch analysis. The credibility of the very high NPV and BCR may require further validation. The site is **Rank 3** overall and **Rank 1** for the property only scenario.

<b>2,186,780 GEL</b>	<b>34,586,309 GEL</b>	<b>34,586,309 GEL</b>
<b>Total PVC</b>	<b>Property PVb</b>	<b>Total PVb</b>
<b>Net Present Value (NPV)</b>	<b>32,399,529 GEL</b>	<b>32,399,529 GEL</b>
<b>Benefit Cost Ratio (BCR)</b>	<b>15.8</b>	<b>15.8</b>

