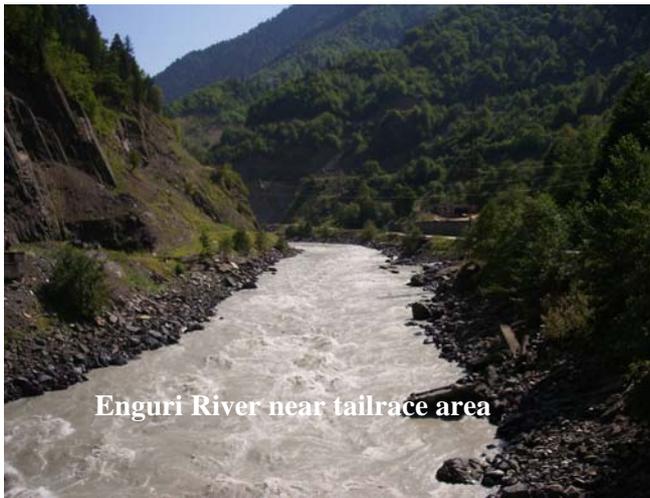


Government of Georgia
Ministry of Energy

KHUDONI HYDROPOWER PROJECT

ENVIRONMENTAL AND SOCIAL PANEL OF EXPERTS



Enguri River near tailrace area



Enguri River downstream of
confluence with Nenskra River



REPORT #1

Final

From the Kaishi community within
the proposed inundation zone

Environmental and Social Panel of Experts

Erik Helland-Hansen
John Ambrose

**September 17, 2007 (final draft)
October 18, 2007 (final version)**

1st Mission: Familiarisation and initial interaction meetings of the joint technical and environmental/social panels of experts

Tbilisi and Svaneti 3-8 September 2007

1.0 Introduction

Role and Objective of Panel

The role of the Environmental and Social Panel of Experts (Panel or E/S-POE) is to provide independent advice to the Ministry of Energy, Georgia, during their process for preparation of documents for financing and implementing the proposed Khudoni Hydropower Project (the Project). The Panel, comprising of Erik Helland-Hansen, environmental/planning expert (Norway) and John Ambrose, environmental/social expert (Canada), is expected to be fully objective and impartial and cover subject matters identified in their Terms of Reference and within their areas of expertise.

The primary objectives of the Panel are to provide guidance on key issues and methods for preparation of the Strategic Environmental Assessment (SEA), Environmental and Social Safeguard Studies (in the form of the Environmental and Social Screening Report and the Environmental Impact Assessment - EIA - and Resettlement Action Plan (RAP). This work comprises such activities as review of environmental and technical reports, quality assurance, support to effective integration of EIA findings and recommendations into the technical formulation of the Project, provision of advice regarding costing, scheduling, enhancement measures and implementation for the Environmental Management Plan (EMP) and RAP. In particular the E/S-POE is asked to advise the Client on optimizing alternatives and synergies between engineering/economic and environmental/social aspects of the Project.

Timing of Mission and Reports

This 1st mission and Report #1 comes before the end of Phase 1. Thus the Safeguard consultant's report on Preliminary Environmental Assessment and Social Screening has not yet been made available and reviews have been limited to their Inception and Interim reports. Two days of field visits and interaction with the Safeguard consultant, the Technical consultant and the Technical Panel of Experts, meetings in Tbilisi and two days of study of documents in home offices have enabled the Panel's elaboration of this Report #1.

Itinerary and Reporting

The itinerary of the POE during the 1st mission was as follows:

- The Panel arrived in Georgia on 2-3 September 2007. They participated in a joint meeting at the Ministry of Energy hosted by Deputy Ministers Archil Nikolaishvili and George Abdushelishvili. The Engineering POE, the joint venture engineering consultants (JV) Colenco/Stucky from Switzerland, environmental consultants BRL/A.R.S. Progetti, from France/Georgia, and the World Bank also participated in the meeting. Following the meeting the two POEs drove to the Enguri Dam hotel where they spent the night.
- The entire day of 4 September was spent on a field reconnaissance of the Khudoni Hydroelectric Project. The tour included: 1) 32 km access road between Enguri and Khudoni; 2) inspection of the partially completed underground works for the powerhouse; 3) inspection of the proposed dam axis and diversion works; and 4) reconnaissance of the reservoir, including the location of a potential alternative dam axis upstream of the current site. The Enguri River valley was inspected up to about 15 km upstream of the Enguri/Nenskra confluence.

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- On 5 September the Environment Panel first participated in a meeting with the Enguri Dam administration and then in the Engineering panel's inspection the Enguri Dam and foundation adits. The Environment Panel spent the afternoon visiting the lower/middle reach of Nenskra River upstream of its confluence with Enguri River where the inundation of an alternative reservoir would reach. The Kaishi community was visited towards the end of the day.
- The POE returned to Tbilisi on 6 September.
- 7 September was dedicated to preparing this report.
- The report was presented verbally to the Ministry and the World Bank at a meeting on the morning of 8 September.
- The POE departed Georgia for their respective homes on 8-10 September 2007.
- The completed draft copy of this report was distributed to the Ministry of Energy, World Bank, Engineering POE, and JV for review and comment on 17 September 2007.
- Comments received from Colenco/Stucky and the World Bank have been considered and incorporated as relevant into this final version.

2.0 Study Program for Environmental and Social Aspects

The structure of the study program is effective, particularly as it runs parallel with the study activities of the technical group. It is important that the two teams (environmental/social and technical) work closely with one another in order that the technical group is able to incorporate environmental/social results into the decision making process in terms of dam (and related infrastructure) location and design. This point is elaborated under the review of reports by the Technical Consultant.

3.0 Review of reports by Engineering Consultants

Available reports:

- Khudoni Hydropower Project - Draft Inception Report by Colenco-Stuckey Joint Venture - 22.08.07
- Khudoni Hydropower Project - Draft Phase I Report on Assessment of the Existing HPP Site and Works by Colenco-Stucky Joint Venture - 26.08.07

The two reports are issued virtually in parallel and much material from the Draft Inception Report is recycled in Draft Phase I Report, thus comments below address the two reports in sequence.

Draft Inception Report

- It is stated in 1.1: *In Phase II of this project the Consultant will review all reasonable project alternatives and select a preferred layout for approval by the Ministry of Energy.* This statement is welcomed and forms the basis for most of the comments below.
- The cascade development of the Enguri River Basin, with in all 4 dams and 7 power stations is shown schematically and the text opens up for alternatives to be considered. Although politically sensitive, it is necessary to inform the reviewer in this section 2.1 of the role and state of affairs of the 4 Vardnili HPPs downstream of Enguri HPP. The table has some confusing figures regarding catchment area and usable storage.
- The alternative layouts and dam options discussed in 8.6 & 10, with very different materials requirements and should also be evaluated with environmental impacts of quarrying, hauling and landscape restoration in mind.
- It would add considerable to the credibility of a report of this nature if the environmental and social dimension of the planning and design exercise were treated with more respect and accuracy than provided under 13.

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Draft Phase I Report

- In the Executive Summary it is stated that *it is essential to optimize the dam height to create a reservoir that has:*

- **Maximum dead storage:** to trap sediments, to prevent the Enguri reservoir from being too rapidly filled with materials, and
- **Maximum live storage:** to produce peak (and/or high peak) power electricity.

These statements are not substantiated nor justified by the report¹. The fundamental questions to be asked at this stage thus seem to be:

- How much sediment is deposited annually in the Enguri reservoir and what is the mechanism of sediment trapping? What are the alternative approaches to sediment management and what is the desired upstream sediment trapping facility (e.g. reservoir dimensions and dead storage volume).
- When may the market be willing to pay for peak power and what is the marginal value of incremental storage.

Until such questions have been looked into and simulation runs made for all reasonable alternative systems, a conclusion can not be reached on reservoir capacities.

- This raises the issue of how much efforts needs to be put into studying the Enguri reservoir and its operation schedules in order to identify an optimal Khudoni scheme upstream.
- Further alternative dam sites and sizes need to be considered, keeping in mind that **the most effective environmental mitigation is good site selection**. If a dam could be located downstream of the confluence of Enguri and Nenskra rivers and upstream of Kaishi, one would avoid the inundation of Kaishi, whilst a dam on Enguri upstream of the confluence could in addition keep Nenskra River unregulated for environmental flow purposes. Low dams at any location may be developed as a run-of river installation with daily pondage and thereby drastically reducing the environmental impacts of the ecological and social nature. It is of course the Technical consultant's task to ensure that all reasonable project alternatives are evaluated in technical and economic terms whilst the Safeguard consultant is responsible for assessing the environmental and social effects of alternatives to the scheme under study.
- The discussion of a mixed vs. underground solution at the end of 5.3 is confusing as it sites very different lengths of tunnels for two alternatives with similar start and end points.
- During discussions it has been stated by the Technical consultant that sediment data is unavailable for Enguri River. Yet section 6.4 firmly informs of sediment quantities both arising from Enguri and Nenskra rivers. Since it is argued that the Kaishi reservoir is needed for future sediment storage to relieve the Enguri reservoir where sedimentation is already a problematic operational issue, such hydrologic information is crucial to the planning of the Project and must be handled with professional seriousness. The information in Table 6.2 must be explained and backed up with facts.
- The remainder of the report is primarily of technical interest, but the comment from the Inception Report about environmental dimensions of dam types and materials handling also applies to this report.

4.0 Review of Strategic Environment Assessment

Available reports:

- Georgia's Power Sector: Strategic Environmental Assessment, Draft Study Report, August 2007 - by SEEC - South East Europe Consultants Ltd.
- Georgia: Strategic Environmental Assessment of Power Sector Development, Summary Report, Draft, August 31, 2007 - by Sustainable Development Dept., Europe & Central Asia Region, World Bank.
- Terms of Reference, Georgia Power Sector, Strategic Environmental Assessment, April 20, 2007.

¹ Further information was provided on the last meeting in Tbilisi and will be incorporated in subsequent reports from the consultant.

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Initial Review

The reports were received on Panel's arrival in Georgia, but it was not possible to review them adequately for the draft version of this report. Such review, albeit very brief, has now been carried out and is provided below in the Expanded Review section. The initial principal remarks that were provided on the draft version presented in Tbilisi were:

- At this time, the draft document is primarily a technical/economic national least cost expansion plan for power development rather than an assessment of environmental and social issues at a strategic level. Environmental and social considerations appear to be add-ons and not central, which they should be, to a document termed a SEA.
- A matrix comparing the various power opportunities to environmental and social values would enhance the report.
- Environmental data may be incomplete / misleading. In the case for Khudoni the report says that there are no reserves or parks – providing a reason for not giving importance to the fauna of the area. But the interim report for the EIA by BRL states the importance of the area's biodiversity (highest biodiversity index in Europe), the high level of faunal endemics and a number of species with a global or national threatened status. Based on incomplete information for the one area for which we are now familiar, the question arises as to how reliable data are for the other schemes, and ultimately, how reliable is the matrix for comparing the environmental factors of the various schemes.
- Such a study should also address the cumulative effect that would result if a range of projects are to be developed. This is particularly critical in a region with such an important biodiversity and with a number of species with threatened status.

Expanded Review

The above comments are now amplified and expanded as follows (references to 'environment' encompasses also the social dimension) with general reference to the SEA report:

It is the Panel's view that such a study should focus more directly on the environmental and social parameters as these can be affected by the energy projects that Georgia is considering for future development. The outcome of the report should provide a clear understanding of the effects that such energy development activities will have on the environment. A transparent ranking of the various schemes from most significant impacts to least significant impacts should be a product of the study. As well, the report should examine the current government's energy policy and legislation from the point of view of the environment. In examining the document our conclusion is that this document requires significant revision and strengthening of the environmental and social coverage and analysis before it can serve as an acceptable SEA. We are concerned about the use of an analytical approach that can not be tested by a reviewer and the numerous erroneous statements. Only a few specific examples have been given.

- The first 112 (of a total of 148) pages of the document describes in laborious detail the various power schemes under consideration by the Government, without a mention of the environment. All this technical detail appear to be a result of a massive cut and paste exercise.
- When one looks at the table of contents, there are no headings or sub-headings referring to environmental matters until chapter 9.
- We disagree with the stated main purpose of the study: *"The main purpose of the SEA Study was to provide a preliminary assessment of the viability of the Khudoni hydropower project, based on which decisions can be made whether this project is promising and warrants further assessments (e.g. full-fledged feasibility study)."* This purpose has no relation to an SEA which is supposed to rank power options integrating such criteria as technical, economic, environmental and social factors.
- The statement that *"Merit order for different generation options through 2021 taking into account economic, environmental and social aspects."* would make sense if only the

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environmental and social information that has been used in the study was not so general and incomplete.

- The five pages of environmental discussions (pages 112 to 116) provide basically irrelevant and oddly interpreted, descriptions of international obligations with limited or no direct relation to the energy / environment situation in Georgia. More importantly in this section would have been to cover Georgia's legal framework, past experiences (successes and failures), and current thinking towards energy and the environment.
- Page 119: "*In order to preserve the area of available agricultural lands, the project provides compensation per hectare.*" This is an incorrect statement; once you inundate agricultural land it is gone forever, and certainly monetary compensation is not going to bring it back. This is a case of compensating people's losses, not of compensating for loss of agricultural land (the development of a commercial or artisanal fishery in a reservoir would compensate for loss of food production and thus loss of agricultural land).
- Page 122: "*Deciduous forests prevail which can hardly satisfy the local demand for firewood*" This statement does not make sense.
- Specifically for Khudoni: Broad sweeping statements of incomplete list of environmental conditions. Not one mention of the importance of the area's biodiversity (reported to have the highest biodiversity index in Europe). Such may also apply to locations of the other schemes.
- We don't know where the schemes are located – no map. A series of maps could show areas of biodiversity interest and cultural interest. A map could be used to indicate extent and density of human settlement and another map could be used to show potential reservoir outlines.
- In general, the authors did not spend much time seeking out environmental and social information. At the very least they could have repeated the information for Khudoni presented in the interim screening report.
- Where information is given in detail (e.g. page 129) these rambling descriptions are unnecessary.
- Just as the interim screening report has a reasonable data base, such could have been done for the other schemes or at least attempted and where data was not available this should have been stated. If all sites had a data base similar to that for Khudoni then a good comparative analysis could have been conducted.
- There is mention and description of wind, solar and geothermal power but no analysis in terms of the environment – they were dismissed on cost alone which is inappropriate for a study of this type. The text also needs to discuss what is the government's policy towards these renewable energy resources and what are the proposed renewable energy schemes that may be under consideration.
- There should be an easy to follow matrix that would compare each of the schemes (including the renewables) against the various environmental and social impacts.
- The multi-criteria analysis (MCA) is based on a method which is unknown to the Panel. It is explained in a mathematical format with a 'black-box' approach to how data are treated and virtually inaccessible to most reviewers. As presented in the draft SEA, the methodology is not transparent and can thus not be considered to be in tune with contemporary approaches. Additionally the weighting of criteria is fully expert driven, there seems to be no stakeholder inputs anywhere in the process. To environmentally oriented reviewers the MCA process is hardly convincing and the results of the draft SEA at this time are at best doubtful.

In summing up, this draft document is not an acceptable SEA and needs significant revision and strengthening. In order to make it acceptable a good deal of additional work will be required, particularly in the area of environmental and social data gathering and analysis and application in a transparent MCA process. This draft document would not pass the scrutiny of the international environmental community given the issues raised above.

5.0 Key Issues and Methods for E/S Screening, EIA and RAP

This section comments on available reports in bullet format and provides thoughts for consideration on the reports to come.

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Environmental and Social Screening (Interim Report):

(Note: Draft report was scheduled to be completed by the end of August 07 but at the time of the Panel's visit the draft had not been prepared).

- In general, the TOR for the Screening report requires more detail than is necessary for this level of reporting. Much of what is required can be, and should be, covered in the full EIA.
- The interim report does not contain information beyond the basic data sections and the section that covers legal instruments.
- There is a comprehensive inventory of environmental and socioeconomic data including legal framework, however, as pointed out by the World Bank review of the Interim Report, there are many gaps and inaccuracies in the legal framework documentation.
- There is no reference to socioeconomic or resource data available that may have been collected during initial implementation of the proposed Khudoni dam project. Of particular interest would be social data that may have been collected for purposes of resettlement to New Kaishi.
- A more effective and efficient approach to data collection would have been to focus on those data sets that are relevant to the main issues (which have not been identified in the interim report). This would have led to an identification of the important environmental components and to the additional studies required for the EIA phase.
- Gap analysis has not been conducted and the proposed table of contents of the inception report does not accommodate for such.
- Legal framework section should include an analysis of effectiveness of relevant legal instruments (this can be done in the EIA phase and will include recommendations for institutional strengthening in relevant areas). This section would also include lessons learned (as indicated in the proposed table of contents).
- Stakeholder identification process and public consultation program should be explained. Although the consultation program can be detailed in the EIA, a framework should be developed for the screening report.
- In light of the fact that the dam location has not been finalized, the screening report should include sufficient information for examining various dam site alternatives, and consideration should be given to including a matrix that would allow a comparison of dam locations and types with the various environmental / social impacts to be expected.

EIA (for consideration during the next phase):

- The consultation requirements for the EIA of the Government of Georgia and the World Bank must be taken very seriously with consideration given to frequent input from all relevant stakeholders including local and national NGOs.
- The EIA must be conducted on a given dam site, but during earlier stages of the EIA process it is hoped that environmental and social issues have influenced the engineering considerations enough to ensure that the overall best site is selected and alternative considerations of the EIA will conclude correspondingly.
- Depending upon site selection, downstream effects should be given consideration and compensation flows calculated accordingly.
- Consideration should be given to economic development opportunities, particularly related to the reservoir (e.g. fisheries, recreation).
- Mitigation for resource loss (riverine and aquatic habitats, terrestrial habitats) should consider biodiversity offsets (other similar areas brought under official protection) consistent with World Bank policy. This should also be done in view of Government of Georgia's ratification to the Convention on Climate Change.
- Comprehensive forest management planning to avoid unsustainable timber harvesting practices will be necessary to protect the watershed of the proposed dam. This will include institutional strengthening (legal instrumentation, enforcement, penalties).

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- Major studies likely to be required will include those on affected terrestrial ecosystems (flora and fauna communities), aquatic ecosystems, (although individual species are important, it is also important to know their position within their respective communities and the function that ecosystem components have in the maintenance of these species and their populations) and cultural heritage.
- Effective monitoring of the implementation of the environmental management plan should be designed and put into place (institutional strengthening may be required).
- Assessment of the net carbon emission from implementing the project should be provided.
- Restrictions to peak flow regimes may need to be suggested if alternative dam sites are suggested.
- Reservoir management approaches for sediment, temperature, dissolved oxygen, nutrients etc. control may need to be suggested incorporated into design of dam and draw-off facilities.
- Safeguard inputs to technical planners may be in the form of environmental criteria. Some possible criteria, partly summing up issues listed above, are:
 - Minimum compensation release from the dam
 - Maximum/minimum filling rate of reservoir to protect ecosystem against abrupt changes
 - Peaking restrictions such as minimum turbine discharge during off-peak hours
 - Location of quarries in dead storage of reservoir
 - Route alignment for new road around Khudoni reservoir and other roads plus transmission line.

RAP (for consideration during the next phase):

- The RAP and its implementation is the mitigation required for the impact of people and resources being displaced as a result of the proposed project.
- Financial and time resources required to prepare and implement an effective RAP must not be underestimated, considering that a full survey of all project-affected persons must be conducted and an assessment of all personal and common resources must be carried out.
- The RAP will have its own comprehensive consultative process.
- The consultative process will be fully participatory – the people affected will have a major say in their destiny.
- The consultant should have a strong presence in the community for the period of RAP development.
- If a host community is involved, it will also be part of the consultative process.
- The RAP will likely extend beyond the immediate area affected, and those who are affected indirectly will be included in the RAP process.
- A reminder: The World Bank safeguard policy on Involuntary Resettlement states that no one should be worse off, following resettlement and compensation, than they were prior to resettlement, and the focus of the policy is on livelihood restoration.
- Resettlement is the first choice and only when there is no resettlement possibility (assuming that the project would not be halted due to this possible outcome) would cash compensation for lost land and physical property be considered.
- Affected people must be resettled and compensated prior to construction (where construction directly affects households/individuals) and prior to inundation.
- Remember, it is not just resettlement and a new home, but the continuation of, and development of, new livelihoods will be necessary.

6.0 Key Environmental Issues (in the view of the Panel)

- Analysis of alternatives
- Loss of homes and livelihoods
- Loss of forest cover, habitat and decreased terrestrial populations
- River aquatic systems lost

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- Increased pressure on important species
- Erosion from further land degradation
- Increased pressure on forest resources
- Cultural and social disruption
- Reservoir management
- Environmental and social enhancement
- Implementation modality for EMP

7.0 Other Issues (in the view of the Panel)

The fact that the Enguri dam and reservoir exists downstream of the Khudoni project means that it will contain key information of value to upstream planning and some impacts from Khudoni may also extend beyond the Enguri dam. Although such issues may be beyond the scope of the consultant's work, the need for studies of the following are suggested here:

- Energy budget analysis of Enguri reservoir to ascertain whether microclimate changes may be substantial and significant.
- Sediment inflow, outflow and storage measurements in Enguri reservoir and studies to understand the mechanisms of sediment deposition and movements within the water body.
- Limnological studies to understand reservoir stratification and turnover characteristics combined with water quality surveys under different climatic and operational conditions.
- Incorporation of effects downstream of Enguri dam in the analysis for Khudoni dam by considering means of enhancing the fluvial ecosystem and riparian uses and problems associated with the river. Such actions as increased environmental release, artificial flooding to mimic ecosystem requirements, flood warning system connected to rapid opening of release gates in Enguri may be considered.
- Cumulative effects.

8.0 Follow-up

The Panel will need to review the draft and draft final screening reports when they are made available. This will have to be done in the Panel member's respective home offices (Norway and Canada) and comments forwarded to the Ministry of Energy.

It is suggested that the Panel review the work plan for the EIA once it has been prepared

It is suggested that the Panel's second visit be conducted at a time when the EIA and the RAP are underway but not at a point too advanced in the process.

The Panel will also review draft and draft final versions of both the EIA (including the environmental management plan) and the RAP. If a third visit is not possible these reviews will take place in the Panel member's respective home offices.

Additional Literature Cited:

BankWatch Network. 2007. The Khudoni Dam: A necessary solution to the Georgian crisis?

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