

# **Rogun Hydropower Project**



## **Final Report of the Environmental and Social Panel of Experts**

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## Abbreviations

BVO	Basseinoe Vodnoe Ob'edinenie (Basin Water Management Body)
EDS PoE	Engineering and Dam Safety Panel of Experts
E&S PoE	Environmental and Social Panel of Experts
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GoT	Government of Tajikistan
HPP	Hydro-Power Project
ICWC	Interstate Commission for Water Coordination
IPCC	International Panel on Climate Change
PMF	Probable Maximum Flood
RA	Resettlement Audit
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
TEAS	Technical and Economical Assessment Studies

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## 1 EXECUTIVE SUMMARY

This is the Final Report of the Environmental and Social Panel of Experts (the “E&S PoE” or “Panel”) on the Rogun Hydropower Project in Tajikistan. It is the conclusion of work undertaken since May 2011 during which the Panel has interacted closely with the Government of Tajikistan (GoT), the World Bank, the Environmental and Social (ESIA) and Technical and Engineering (TEAS) consultants and the Engineering and Dam Safety (EDS) Panel of Experts. In this period the Panel has visited the site, produced 10 reports and made presentations during regional consultations in 2011, 2013 and 2014, most recently in Almaty in July 2014 at which the Final Draft of the Environmental and Social Assessment Report was presented and discussed.

The overall role of the Panel has been to ensure that the ESIA of the Rogun Hydropower Project has been conducted in accordance with good international practice and World Bank guidelines.

As reported below the Panel finds that the Final Draft ESIA (the “ESIA”) is of acceptable international standard, and subject to some comments on key issues raised in the present report the Panel agrees with the overall conclusions and recommendation made in the ESIA.

The Panel has followed the TEAS studies closely and has from an environmental and social perspective no reason to doubt the international standard and conclusions of these studies that form the basis for the ESIA.

This implies that *the Panel agrees with the overall conclusion of the studies* that construction of a high dam (from 300 m to 335 m high, full supply levels 1255 and 1290 m) at Rogun, located upstream of the 300 m high Nurek dam in a cascade on the Vakhsh River (tributary to the Amu Darya River), is feasible, and that the environmental and social impacts of such a dam can be satisfactorily mitigated. The Panel further agrees that the Vakhsh cascade can be operated in such a manner that no change in the current downstream flow pattern will occur. However, both potential negative and positive impacts need to be considered, i.e. negative in terms of possible reductions in downstream summer flows, and positive in terms of improved flood protection and possible low flow augmentation in dry years.

This conclusion is subject to implementation of further studies and measures recommended by the TEAS and ESIA Consultants and the EDS Panel, including a strengthened legal and institutional framework on water sharing in the Amu Darya Basin.

The Panel finds that the advice and guidance provided to the ESIA Consultant has been largely heeded and that most chapters in ESIA presented in Almaty require no further work. However, the Panel still has concerns on three key points: (1) possible downstream impacts in the Amu Darya Basin, (2) resettlement of up to 42,000 people in the area to be affected by the future Rogun reservoir, and (3) the final selection of dam height.

On the *downstream impacts in Amu Darya Basin* the Panel notes that although the current mechanisms and practices for water allocation appear functional and satisfactory to all parties in the present situation, they suffer from lack of clarity and transparency and may not be sustainable in the long run with emerging pressures and trends in water availability and demand. It is the view of the Panel that the necessity for future harmony and avoidance of misunderstandings or differences in interpretation, calls for Central Asian countries, including Afghanistan, to come to a revised agreement, and a strengthened legal and institutional framework, on water sharing in the Amu Darya. Such an agreement should include clear, understandable, transparent, monitored, and enforceable rules to ensure equitable water sharing, especially under dry conditions.

Further, the Panel strongly recommends that a formalised and appropriately monitored management agreement of the Vakhsh reservoirs for normal, wet and dry years be developed. This

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agreement would have to include a river monitoring and flood forecasting/warning system to be used as support for transparent monitoring of Vakhsh cascade water use and management.

On the *resettlement issue* the Panel notes that the World Bank Operational Policy 4.12, other international requirements and good industry practice proposals require that resettlement should as far as possible be avoided, hence the proposed focus on dam height optimization, and that the livelihoods of involuntarily resettled persons must be improved or at a minimum restored, hence the Panel's recommendations pertaining to livelihood restoration.

The Panel finds that the resettlement documentation has been significantly improved in the course of the Panel's involvement, and is now generally adequate, but that two important comments expressed on the last iteration of these documents remain: (1) while livelihood restoration is the key issue of this resettlement, livelihood restoration planning remains weak in the final Resettlement Action Plan (RAP), and (2) the RAP does not convey a clear commitment from the GoT to implement it, regardless of the source of funding of the Project. The Panel therefore reiterates its recommendation that the GoT should commit unequivocally to implementing the agreed Resettlement Policy Framework (RPF) and RAP, regardless of final arrangements for the funding of Rogun Hydropower Project.

On the *final selection of dam height* the Panel observes that the difference in economic parameters between the two feasible high dams is not large. This increases the importance of non-monetary parameters, which, at this point, have not featured prominently, if at all, in the comparative analysis. Such non-monetary parameters include, amongst others: (1) the cumulative effect of displacing, resettling, and rehabilitating 42,000 people: while the direct cost of resettlement is more or less proportional to the number of the people displaced, the difficulty of finding suitable agricultural land and/or jobs for a larger number of people and the related impoverishment risks will increase more than proportionally; (2) the potential for exacerbated riparian sensitivity in relation the highest dam; and (3) the incremental debt burden for the population of Tajikistan.

All trade-offs should therefore be carefully assessed and the Panel is of the opinion that giving further detailed consideration to only the highest dam alternative is not sufficient. The recommended way forward for such an assessment would be to take advantage of the forthcoming project optimisation phase to apply a multi-criteria decision approach, or similar, with stakeholder participation, to arrive at an optimised dam height based on both technical and social considerations.

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## 2 INTRODUCTION

### 2.1 GENERAL PROJECT BACKGROUND

The proposed Rogun Hydropower Project (HPP) is located about 110 km from Dushanbe, the capital of Tajikistan. It is located on the Vakhsh River, which merges with the Pyanj River to form the Amu Darya River. The selected dam site is in a narrow gorge with steep flanks, some 6.5 km from Rogun town. Rogun HPP is part of the Vakhsh River cascade, the main component of which is the Nurek dam and HPP (300-meter high earth dam, with a generation capacity of 3,000 MW), which entered into operations in 1981. The Rogun dam would be located about 75km upstream of Nurek.

The original design for the Rogun HPP comprised the following key components:

- A 335m high embankment dam with a clay core and a crest at elevation 1300 masl;
- An underground power house (installed capacity per the original design: 3,600 MW) and transformer units, with associated diversion tunnels.

Construction started in 1982 and continued until 1991 when it stopped due to the collapse of the Soviet Union and the outbreak of the Tajik civil war. By 1991 most of the site preparation works and about 70% of the underground works had been completed. In May 1993, after a partial collapse of both diversion tunnels, the cofferdam was washed away by a flood. Studies resumed in the 2000s, with a revised feasibility study by Lahmeyer International and an updated technical design from HidroProyekt Institute (Moscow). Construction also resumed towards the end of the 2000s, until it was stopped in 2011 (except for urgent maintenance works) per an agreement between the Government of Tajikistan and World Bank, pending the completion of new studies, including a Technical and Economical Assessment (TEAS) by Coyne et Bellier and an Environmental and Social Impact Assessment (ESIA) by Pöyry, both under World Bank funding and in line with applicable World Bank policies.

### 2.2 THE PANEL'S MANDATE AND ITS IMPLEMENTATION

#### 2.2.1 The Panel and its Mandate

Under World Bank operational policies, large hydropower projects require the involvement of two independent Panels of Experts: (a) one Panel for engineering/dam safety aspects ("EDS Panel"); and (b) the second for environmental/social safeguards aspects ("E&S PoE", or "Panel").

The objectives of the E&S PoE are the following:

- (a) to ensure due diligence and international quality standards in the studies, including integration of international standards for data, methodologies, benchmarks for impacts, and design criteria;
- (b) to provide high level and professional independent advice and guidance to support objectivity and credibility in the assessment process; and
- (c) to share technical expertise and knowledge and so contribute to dialogue amongst Consultants, the Government of Tajikistan and riparians.

Specifically, the E&S PoE's mission is to ensure that the ESIA process is conducted in accordance with Tajik and international good practice and standards, including the World Bank safeguards, notably: Environmental Assessment (OP/BP 4.01); Involuntary Resettlement (OP/BP 4.12); Safety of Dams (OP/BP 4.37), Natural Habitats (OP/BP 4.04); Projects on International Waterways (OP 7.50) and Physical Cultural Resources (OP/BP 4.11).

The Panel includes the following members:

- Torkil Jønch Clausen, chair, water resources;

- Richard Fuggle, environment;
- Frederic Giovannetti, social and resettlement;
- Erik Helland-Hansen, environment and planning;
- Ezio Todini, hydrology and water resources.

### 2.2.2 Implementation of the Panel's Mandate

Between May 2011 and July 2014, Panel members visited the Project area in four occasions and participated in:

- Three regional consultative meetings involving the governments and civil society organisations from riparian countries<sup>1</sup> in Almaty;
- Numerous meetings with representatives of the GoT, the World Bank, the EDS PoE, and the ESIA and TEAS consultants, in Dushanbe, Washington D.C., Copenhagen, and Paris;
- Internal Panel meetings.

Ten interim advisory reports were compiled and submitted (see Appendix 1): the essence of these submissions is captured in this Final E&S PoE Report that is to be publicly disclosed.

### 2.3 ESIA AND PANEL'S WORK PROCESS

From the Draft Inception Report through to the Final Environmental and Social Impact Assessment (ESIA), all studies undertaken by the ESIA consultants (Pöyry) were monitored by the E&S-PoE, which provided comment and input to:

- The initial and expanded ESIA Screening Reports;
- Several iterations of the environmental/social cost assessment and Alternatives Analysis;
- Three iterations of the Resettlement Action Plan (RAP), the Resettlement Policy Framework (RPF) and the Resettlement Audit;
- Three iterations of the ESIA (three volumes).

In its reports and presentations the Panel has focussed on the key strategic issues; however, a range of detailed comments to evolving drafts have been provided in direct interaction with the Consultants.

At the screening stage (August 2011) the Panel distinguished between three types of ESIA issues:

- Type A: Issues covered in depth by the Consultant for which little additional work was required (vegetation, fauna, cultural heritage)
- Type B: Issues covered to some extent, but some additional work required (geology, protected areas, site management, social impacts/resettlement)
- Type C: Issues requiring immediate and considerable attention (hydrology, sedimentation, climate change, downstream impacts, environmental and social aspects of economic analysis)

In the draft final ESIA disclosed for Regional consultations in July 2014 the Consultant has addressed most of these issues to a level where the Panel found the report acceptable. Key issues for which attention is still required are (1) downstream impacts, (2) resettlement and (3) selection of final dam height.

Throughout its engagement the E&S PoE stressed the need for close cooperation and exchange of ideas and data between the technical (TEAS) and environmental and social (ESIA) consultants.

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<sup>1</sup> Including Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan.

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## 2.4 THE APPROACH TO IMPACT ASSESSMENT

The Consultant's execution of the ESIA and associated reports followed conventional practice. Particular attention was given to ensuring that both the World Bank's safeguard policies and Tajikistan laws were observed. A complicating factor in the studies is that the Rogun HPP was conceptualised in the middle of the 20<sup>th</sup> Century, during the Soviet era, as a project to support irrigation and power generation for the benefit of the then Central Asian soviet republics. Excavation of diversion tunnels and a powerhouse commenced in the early 1980s, as well as some resettlement, but construction was halted in 1990-1991 following the political changes in the region. Site activity was resumed in 2008 together with resettlement. Since 2012 only safety related and maintenance activities have been carried out pending the completion of the technical, economic, environmental and social assessments (TEAS and ESIA), to ensure that the project is undertaken to meet current international standards. As a consequence of these studies, the Project has changed in objectives, and it is now proposed that Rogun serve as a multi-purpose project generating power, safeguarding the Vakhsh cascade from floods, controlling sediment, and potentially allowing for additional water releases for downstream irrigation in dry years.

These factors have required the ESIA Consultant to accommodate dam height alternatives and Project objectives not initially envisaged. The final ESIA takes into account these iterative changes and the suggestions of the E&S POE. The Panel accepts that the ESIA has been extended in scope to cover the full Vakhsh cascade. The Panel considers this an acceptable approach to incorporate cumulative impacts into the Assessment.

## 3 KEY ISSUES COVERED BY THE PANEL

### 3.1 GEOLOGY, SOILS, AND ASSOCIATED HAZARDS

The geological conditions of the project site have been decisive for the design and layout for the dam and hydropower project. However, the geological investigations carried out by the TEAS Consultant revealed that geology as such will not create particular design problems, but there were four points that needed to be considered specifically and received attention from the ESIA Consultant, namely:

- Slope stability under the changed conditions with the presence of a reservoir;
- Seismic potentials of the site calls for particular attention to the dam's ability to resist earthquakes and required assessment of downstream risks;
- Reservoir triggered seismicity due to the presence of the very deep reservoir;
- Presence of a salt dome or stock located in the dam foundation close to the upstream coffer dam.

The TEAS Consultant's conclusion that large landslides, the salt stock and the earthquake risks are well within international safety standards are trusted by the E&S PoE. Recommendation made by the ESIA Consultant that appropriate seismic monitoring be installed urgently are properly reflected in the TEAS Consultant recommendation *"to restore the existing seismic network in the project area and ensure proper monitoring of seismicity near the site before, during and after construction"*. The E&S PoE understands that GoT is currently taking action accordingly.

The E&S PoE emphasizes that reservoir bank stability should receive further attention. It is noted that banks may be vulnerable to slumping and land-loss. The Panel suggested expanding the discussion on slope stability and risk of serious landslides to also cover the risk of smaller landslides that could cause both land loss and property damage.

### 3.2 CLIMATE

The climate of the Project area is characterized by hot dry summers and cool winters, with winter precipitation falling as snow, especially on the high mountains where tributaries to the Vakhsh

River originate. This results in highly seasonal flows, with low flows in winter and high flows in summer since most of the water originates from snow and glacier melt.

Rogun reservoir impact on local or regional climate will not be significant due to the relatively small exposed water surface. Temperature moderation close to the reservoir may lead to a few more frost-free days in some years. Greenhouse gas emissions from the reservoir would not be significant. To the extent that electricity generated by Rogun substitutes for power generated by carbon based fuels, there would be large reductions in greenhouse gas emissions.

Climate change analysis was essentially based on the results of the “Pilot Programme for Climate Resilience (PPCR): Tajikistan”, in which the Vakhsh Valley and the Pamir Glacier Zone were selected as the two sub-regions for climate change impact assessment and climate hazard management. The major findings of the PPCR study reported by the ESIA Consultant, are aligned with the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007), and confirmed by the recently published Fifth Report (IPCC, 2014).

Climate change studies in the region predict two main trends on a regional scale: a general increase in temperature and no major change in overall precipitation, although there may be seasonal changes as more precipitation falls as rain and less as snow, and increasing annual as well as inter-annual variability. These changes may lead to greater average flow volumes, and greater variability. This will occur for several decades while glaciers deplete, after which annual flow volumes will decrease due to extensive glacier recession. In general, the additional storage capacity of Rogun could help buffer the increased variability.

Extreme flows will tend to occur earlier in the season due to the expected rise in average temperature, but the peak discharge is not expected to increase because of more gradual snowmelt earlier in the year. The Panel is satisfied with the current approach to base the Rogun design on the Probable Maximum Flood (PMF) as a conservative estimate.

### 3.3 VEGETATION AND FAUNA

Three chapters (10, 11, 12) of the ESIA are devoted to the flora and fauna of the area that will be directly impacted upon by the Rogun hydropower project. The E&S PoE concurs with the ESIA Consultant’s assessment that the project’s impacts on terrestrial and aquatic flora and fauna are of minor significance. No rare or endangered plants or animals will be inundated by the reservoir and no significant aquatic life occurs either in the reservoir area or in the reach between the Rogun and Nurek impoundments. No natural habitats of importance because of unusual characteristics, limited occurrence, or contribution to crucial ecosystem services will be directly affected by the project (the case of the indirectly affected Tigrovaya Balka Tugai ecosystem is considered below).

The E&S PoE agrees that the exceptionally high suspended sediment load of the Vakhsh River makes it a poor habitat for fish. Also, that the potential for aquaculture in the Rogun reservoir will be limited due to the large variations in water level that will occur because of the proposed operating regime, viz. to keep the level of the Nurek reservoir constant and to allow an approximately 40 m fluctuation in Rogun levels between summer and winter. With this approach the potential for aquaculture in Nurek reservoir may be enhanced.

### 3.4 PROTECTED AREAS

In its consideration of protected areas potentially threatened by the Rogun hydropower project the ESIA correctly focuses attention on the Tigrovaya Balka nature reserve that occurs close to the junction of the Vakhsh and Pyanj rivers. This important Tugai floodplain habitat of cut-off lakes and gallery forests, a feature of the major rivers of Central Asia, has become degraded due to seasonal flooding being eliminated by the controls imposed to operate the Nurek and Vakhsh cascade of hydropower stations, as well as from increased exploitation by encroaching communities. The E&S PoE agrees that further studies are needed to establish the feasibility of making occasional seasonal

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releases of water from the Vakhsh cascade to simulate the floods that occurred before the construction of dams on the Vakhsh River. In order to achieve ecologically desirable outcomes while avoiding harm to communities living on the floodplain, peak flows will have to be carefully dimensioned and an appropriate flood-warning system implemented.

The ESIA addresses valuable ecosystems and protected areas in downstream riparian countries as an integral part of the general discussion of downstream impacts.

### **3.5 CULTURAL HERITAGE**

The E&S PoE observed that both tangible and intangible cultural heritage were adequately addressed in the ESIA and ESMP. Some relatively minor comments expressed by the E&S PoE on early versions of the ESIA have been addressed in the final version.

### **3.6 ENVIRONMENTAL MANAGEMENT**

The first E&S PoE report called for improved environmental, health and safety (EHS) standards. The present conditions were found to be well below internationally accepted standards in many ways. Improvements were strongly recommended by the E&S PoE and the ESIA consultant who later reported that temporary improvements had been made. The E&S PoE is of the opinion that follow-up ESIA activities should continue to give attention to EHS. International standards should be tailored to Tajik conditions; direct blueprints of Western European best practice may not be appropriate. EHS standards should nevertheless be based on an Environment Management System (EMS), as required by standard international requirements.

The issued Environmental and Social Management Plan (ESMP) provides details of the additional actions and studies that must be undertaken as the project progresses. This plan provides details of actions required at the construction site, but as currently formulated, it is not sufficiently detailed to enable a contractor to include environmental and social safeguards in their tender documents.

### **3.7 RESETTLEMENT**

Several resettlement sites located in different areas of the country are being developed to allow self construction of their replacement houses by resettled households. Cash compensation paid in respect of their current assets is used for this purpose. Resettlement sites are meant to provide affected households with different livelihood restoration options, including irrigated agriculture (Dangara), industrial employment (Tursunzade), and employment at Rogun HPP (several sites close to Rogun town).

Resettlement activities are implemented by the Directorate for the Inundation Zone of the Rogun HPP, a special unit set up by GoT for this purpose.

The physical aspects of resettlement are satisfactory, particularly infrastructure delivery at resettlement sites, including public facilities such as schools, health centres, water and power. Also, a grievance mechanism is in place, and engagement with affected people and host communities has generally been consistent. However, as of its first mission in 2011, the E&S PoE recommended that livelihood restoration should be given more attention, both in the documentation (see below section 4.2) and in the actual implementation. As there is little experience in Tajikistan in this area, the E&S PoE also recommended that the Directorate's efforts to improve livelihood restoration activities should be supported by targeted technical assistance. This will become all the more critical when many more people than now are resettled (42,000 as compared to about 2,000) and opportunities to improve or restore livelihoods become correlatively scarcer.

### **3.8 HYDROLOGY AND CASCADE MODELLING**

The Vakhsh River discharges close to 20 km<sup>3</sup>/year at its confluence with the Pyanj: this is about 27% of the flow of the Amu Darya. The discharge is highly seasonal with average July flow reaching 1600 m<sup>3</sup>/s and February flow 175 m<sup>3</sup>/s. This flow pattern is governed largely by snow and glacier

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melt as the dominant form of precipitation in the Vakhsh catchment is winter snow. The construction of the Nurek dam and reservoir (between 1972 and 1979) and the operation of the Nurek hydropower plant changed the seasonal volumes of water discharged by the Vakhsh: vegetative season (summer) flows being reduced and winter flows increased. On average 4.2 km<sup>3</sup> of water have been transferred from summer to winter flow since the commissioning of the Nurek HPP. Consideration of the effects of climate change on mean annual flow suggests that Vakhsh flow is likely to slightly increase until about 2080 due to the increased snow and ice melt as a consequence of the predicted raise in average temperature and then decrease when the glaciers will retract, but that the variability in mean annual flow will become greater. Maximum daily flows will tend to occur earlier in the season but are not expected to rise due to the earlier start and extended duration of the snow melt season.

As the Rogun Project will be part of the Vakhsh Hydropower Cascade a computer simulation of cascade operations was conducted to establish whether the cascade can be managed in a way that would ensure optimum energy generation from the whole cascade (including future developments) while fully respecting downstream water requirements and Tajikistan's commitments under Central Asian water sharing agreements and practices. The model simulated results from various scenarios and operational alternatives using the full set of monthly inflow to Rogun ranging from 1932 to 2008. It included the normal operation of the cascade, the impact of 50 years of sedimentation, and the Rogun reservoir-filling period. The simulations show that it will be possible for the Rogun and Nurek hydropower plants and the Vakhsh cascade to be operated for efficient energy production while at the same time honouring regional water sharing agreements and not transferring more than the present 4.2 km<sup>3</sup> between summer and winter flow. That this is possible is important for both the technical and environmental and social assessments as it implies that possible downstream impacts from the Rogun project can be contained to be no worse than the impacts have been experienced since the Nurek hydropower operation commenced.

The model has also demonstrated that the construction of Rogun will protect the downstream cascade from the effects of the PMF for a long period of time. This protection will unavoidably end when sediment deposition fills the Rogun reservoir. For the downstream cascade to comply with the PMF requirements if Rogun is not built, flood diversion works would be required sooner, instead of being delayed until the Rogun effect disappears.

### **3.9 BASIN COOPERATION AND DOWNSTREAM IMPACTS**

The proposal to build a dam with the World's highest earth wall on the Vakhsh River at Rogun raises the spectre of Tajikistan transferring more than the current 4.2 km<sup>3</sup> from summer to winter flow in an effort to maximize winter energy production. While this is a potential negative impact from a downstream perspective, the dam has at the same time the potential for positive impacts in the form of improved flood protection (passing the PMF for which the current system is not designed) and additional downstream flow realises during dry years. The Panel has consistently advocated for such a balanced view.

To obviate the fear of negative downstream impacts it is imperative that Tajikistan's use of water will be strictly in accord with current water sharing agreements and practices: Protocol 566 of the Soviet era, and provisions of the subsequent interstate agreements of 12 Oct 1961 (Tashkent), 18 February 1992 (Alma-Ata) that created the ICWC and its leading role in annual water sharing negotiations and especially 20 September 1995 (Nukus). Further agreements in 1993, 1994 and 1997 created institutional frameworks to implement the earlier agreements. Recognising the serious impacts that changes in Amu Darya flows could have on the agricultural output, environmental conditions and domestic economies of downstream riparian countries, the E&S PoE has throughout its review of the Rogun project emphasised the need for close study and interrogation of the legal standing of the decades old Central Asian water sharing agreements.

The E&S PoE notes that in the July 2014 Riparian Consultative meetings there was disagreement as to whether current mechanisms and practices for water sharing in Central Asia are functional and

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satisfactory. The legal analysis contained in the ESIA (chapter 8) shows that these water sharing instruments are agreements, declarations or practices rather than treaties, that they lack provisions for monitoring and enforcement; and provide no dispute resolution mechanisms. The E&S PoE notes that the legal and technical basis for the BVO and ICWC water quotas to countries lack clarity by not being explicit and that no documented account of the process and rules applied by these bodies for water allocation between states has been provided. Although generally appearing acceptable by the countries involved, current annual water allocation practice thus remains vague and unenforceable and is not amenable to objective resolution in cases of dispute. It is noted that the current practice does not include Afghanistan that in the future may become a more important stakeholder. The Rogun project planning is thus proceeding without transparent verifiable agreed rules for allocating water between competing seasonal and annual demands.

The Panel is concerned by these lacunae, especially as new pressures and trends in water availability and demand are emerging. The E&S PoE supports the call contained in the ESIA for strengthening the current institutional framework for water sharing among the Central Asian States, including Afghanistan and including a water monitoring system with greater transparency.

The E&S PoE notes that the ESIA consistently states “*Tajikistan will use its full share as allocated by the ICWC*” and that the entire report is based on the assumption that reservoir filling can be achieved using the historical difference between ICWC allocations and Tajik annual withdrawals. This takes no cognisance of the fact that annual volumetric allocations are determined through half-yearly negotiations rather than being determined by known and verifiable rules and technical procedures. Further, the ESIA does not question the assumption that future allocations to Tajikistan will remain higher than its current withdrawals.

To promote harmony and to avoid future misunderstandings due to differences in interpretation of the rules governing water allocations from the Amu Darya, revised agreements between Central Asian countries, including Afghanistan, that are clear, transparent, enforceable, and monitored are required, irrespective of whether Rogun is built or not. Further, the Panel strongly recommends: (1) a formalised and appropriately monitored agreement on management of the Vakhsh reservoirs for normal, wet and dry years; and (2) that a river monitoring and flood forecasting/warning system be used as support for transparent monitoring of Vakhsh cascade water use and management. Such a system will be important to address all operation scenarios, both positive and negative. In order to protect construction workers this system should be commissioned before construction starts.

As a consequence of the above considerations, the E&S PoE endorses the following statement contained in chapter 21 of the ESIA: “*The ICWC member states Kyrgyzstan, Tajikistan, Uzbekistan and Turkmenistan should modify existing agreements and practices to include operation of Rogun HPP in a way as to maximise benefits for all parties, like flood protection, additional water releases during dry summers and additional hydropower generation during exceptionally cold winters. Such an agreement would have to specify the use of the regulating capacity of the Vakhsh cascade for optimising downstream flows under extraordinary conditions.*”

The ESIA description of the impacts of Amu Darya water abstraction on the Aral Sea appears to be based on recent and trustworthy references and consequently reaches the conclusion that “there is no prospect of restoring the Large Aral Sea in the foreseeable future”. However, in the analysis of downstream impacts the provision of water to the Aral Sea is shown to be a “residual issue”, i.e. it is accepted that only water that cannot be used upstream will be available for restoring the Aral Sea. Although Rogun HPP will have a minimal impact on the Aral Sea the Panel is concerned about this apparent disregard for the problem of the Aral Sea and recommends that in any future modification of Central Asian water sharing agreements proper provision be made for an enforceable allocation to the Aral Sea.

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### 3.10 ASSESSMENT OF ALTERNATIVES

Given the serious energy shortfall in Tajikistan the E&S PoE concurs that demand-side interventions alone are not an alternative to generating more electricity. The ESIA analysis of supply-side options, other than hydropower, draws heavily on the World Bank's study of Tajikistan's supply and demand alternatives. The Panel agrees that Tajikistan's energy shortfall will have to be met mainly by hydropower as imports of energy—either as fossil fuels or electricity—to fully meet the shortfall will be considerably more expensive than hydropower. The Panel also agrees that the extremely high sediment load of the Vakhsh River mitigates against construction of a series of small run-of-river installations. The Panel consequently agrees that of all the options a large dam and hydropower project at Rogun, upstream from Nurek and operated as part of a cascade, should form part of the preferred power expansion plan to meet Tajikistan's energy shortfall.

For a hydropower project at Rogun three different dam heights were evaluated, each with three different installed capacities. The alternative recommended on purely technical and economic considerations is the largest dam (335 m, FSL 1290) with an installed capacity of 3200MW.

**Table 1: Environmental and Social Comparison of Alternatives**

Alternatives (3200MW)	Dam height	FSL	Reservoir Area	Productive life span	Households displaced		Agricultural Land Lost	
					Number	% Increase	(ha)	% Increase
<b>1</b>	<b>335</b>	<b>1290</b>	<b>170</b>	<b>130 to 210</b>	<b>6035</b>	<b>248%</b>	<b>3337</b>	<b>236%</b>
<b>2</b>	300	1255	114	80 to 140	2433	133%	1409	145%
<b>3</b>	265	1220	68	50 to 80	1825	-	971	-

Although the technical studies show that both the 1255 and 1290 FSL dams are feasible, from Table 1 it is evident that the technically recommended alternative (1290 FSL) will displace many more people and flood more productive agricultural land than the lower alternatives. In the view of the E&S PoE, the techno-economic differences between the 1255 and 1290 options are not large, but the difference between them has significant social implications that require the trade-offs between technical and social criteria to be carefully considered and articulated.

The recommended alternative will displace 248% more households than the 1255 FSL dam and 236% more agricultural land will be lost. The ESIA did not consider the role of intangible parameters—such as, social harmony, avoidance of protest action, food security, diversion of budget from social programmes, the cost of livelihood support for resettled people and the associated problem of identification of land and jobs for them, macro-economic risks, and the potential financial burden on the people of Tajikistan, riparian sensitivity to one of the world's highest dams upstream – when assessing alternatives from an environmental and social perspective. The E&S PoE recommends that such environmental economic input should be included in studies undertaken to optimise dam size and configuration. Further, the choice of the recommended 1290 FSL option needs to be supported by additional studies that include dialogue with affected people and input of their value systems.

The Panel points in particular to the cumulative effect of displacing, resettling, and rehabilitating 42,000 people: while the direct cost of resettlement is more or less proportional to the number of the people displaced, the difficulty of finding suitable agricultural land and/or jobs for a larger number of people and the related impoverishment risks will increase more than proportionally.

In the view of the Panel, a multi-criteria analysis with stakeholder involvement is one possible approach to be considered as a priority in the next phase of the project. This will provide a better understanding of risks and trade-offs between technical and social parameters, and thus inform and improve decision-making.

## 4 KEY CONCLUSIONS AND RECOMMENDATIONS

### 4.1 ADEQUACY OF ESIA AND ESMP

The E&S PoE is satisfied that apart from the lack of a multi-criteria approach to balance technical and social criteria in the selection of a preferred alternative, the ESIA has been undertaken with due regard to international practise, relevant Tajikistan laws and regulations and the safeguard policies of the World Bank. The bio-physical components of the affected environment have been comprehensively covered using appropriate methodology and assessment procedures. Appropriate procedures have been used to accommodate cumulative effects in the assessment and to estimate potential effects on downstream riparian countries. Cultural heritage, public health issues, and non-resettlement related social impacts such as potential influx are also appropriately assessed, and proposed mitigations are conceptually adequate.

The E&S PoE stresses the need for the Executive Summary of the Final ESIA to highlight key issues and concerns and be written as a stand-alone document for senior decision-makers.

The E&S PoE notes that only a Preliminary Environmental and Social Management Plan has been prepared and that construction and filling of the Rogun dam will cover more than 15 years thus requiring a Management Plan that can be adapted to evolving conditions. The Preliminary ESMP is thus an umbrella plan that sets out an overall approach as well as a framework that assigns responsibilities for action to the Government of Tajikistan (Project Owner), the Project Implementing Unit, and to the appointed contractor. In appendices to the ESMP a summary of the main anticipated impacts and proposed mitigation measures are listed together with sample clauses to be included in contract documents. The annex dealing with construction site management is in greatest detail. The E&S PoE notes that the Preliminary Environmental and Social Management Plan will need to be continuously updated and revised and made more specific to the many facets of the Rogun Hydropower project in parallel with the development of project design and implementation planning and that appropriate resources will need to be available for this.

### 4.2 ADEQUACY OF RESETTLEMENT DOCUMENTATION

The Panel reviewed three iterations of the resettlement documentation prepared by consultants Pöyry for the GoT, which includes:

- A Resettlement Action Plan (RAP) for Stage 1 (the current phase of displacement covering the so-called risk area, i.e. 7 settlements close to the dam site);
- A Resettlement Policy Framework (RPF), intended to cover all displacement related to the further stages of inundation until the reservoir is full;
- A Resettlement Audit (RA) addressing past resettlement conducted to date.

This assessment relates to the last version of these three documents submitted for review by the Panel (23 July 2014).

Key observations follow:

- The RPF is generally fit for purpose and the Panel has no material comments thereon;
- On the Resettlement Audit, the Panel repeatedly advised that RA recommendations should be developed in the form of a time-bound action plan. The last version of the RA now includes a matrix of remedial measures, which essentially addresses the main Panel comment.
- The last version of the RAP that the Panel saw in July 2014 called for two key comments:
  - The Livelihood Restoration Plan (LRP) included in the RAP is conceptual at best: although the document includes a commitment to develop a more detailed LRP at a

later stage, the Panel regrets that its recommendations to this effect, repeatedly formulated as of August 2011, were only partially acted upon;

- The RAP does not convey a clear commitment from the GoT to implement it.

While the Panel commended on several occasions the efforts of the Directorate of Inundation Zone of the Rogun HPP, particularly the quality of infrastructure delivery at resettlement sites and appropriate engagement with affected and host communities, the E&S PoE also observed that the Directorate lacks experience in several important areas related to the implementation of a major resettlement, particularly livelihood restoration and monitoring, and recommended that it should receive external capacity building support for these.

### **4.3 KEY RECOMMENDATIONS**

#### **4.3.1 Selection of Final Dam Height**

Both 'high dams' (FSL 1255 and 1290) are feasible according to both the TEAS and ESIA. However, the E&S POE observes that the difference in economic parameters between the two high dams is not large. This increases the importance of non-monetary parameters, which, at this point, have not featured prominently, if at all, in the comparative analysis. Such non-monetary parameters include, amongst others:

- The cumulative effect of displacing, resettling, and rehabilitating 42,000 people
- The potential for exacerbated riparian sensitivity in relation to the highest dam; and
- The incremental debt burden for the population of Tajikistan.

All trade-offs must therefore be carefully assessed and the E&S PoE is of the opinion that giving further detailed consideration to only the 1290 alternative is not sufficient. The recommended way forward for such an assessment would be to take advantage of the forthcoming project optimisation phase to apply a multi-criteria decision approach, with stakeholder participation, to arrive at an optimised dam based on both technical and social considerations.

#### **4.3.2 Downstream Impacts**

The necessity for future harmony and avoidance of misunderstandings or differences in interpretation, calls for Central Asian countries, including Afghanistan, to come to a revised agreement – and a strengthened legal and institutional framework – on water sharing in the Amu Darya. Such agreement should include clear, understandable, transparent, monitored, and enforceable rules to ensure equitable water sharing, especially under dry conditions.

#### **4.3.3 Resettlement**

The World Bank Operational Policy 4.12, other international requirements and good industry practice proposals require that resettlement should as far as possible be avoided, hence the proposed focus on dam height optimization, and that the livelihoods of involuntarily resettled persons must be improved or at a minimum restored, hence the E&S PoE's recommendations pertaining to livelihood restoration. However, the Resettlement Policy Framework (RPF) and Resettlement Action Plan (RAP) prepared by the ESIA consultants with E&S PoE and World Bank inputs have not, at this point, received formal endorsement of the GoT. The PoE recommends that the GoT should commit formally and unequivocally to implementing the agreed RPF and RAP regardless of final arrangements for the funding of Rogun HPP.

## Appendix 1: List of E&S PoE Reports and Notes

Number	Date of final version	Subject of report
1	May 2011	Inception mission (Tajikistan and Almaty)
2	September 2011	Screening stage mission to Tajikistan, including visits to the Project site, the cascade, and the inundation area
3	November 2012	Riparian regional consultative meeting in Almaty
4	January 2013	Review meeting between World Bank, GoT and Consultants in Washington, D.C. (December 2012) -
5	March 2013	Riparian regional consultative meetings in Dushanbe and Almaty, and resettlement review in Tajikistan
6	June 2013	Panel's attendance to a coordination meeting (Paris) between TEAS and ESIA, with GoT and World Bank also in attendance
7	August 2013	Panel ESIA review meeting (Copenhagen) with World Bank and ESIA Consultant in partial attendance
8	August 2013	Panel's attendance to a coordination meeting (Washington, D.C.) between TEAS and ESIA, with GoT and World Bank also in attendance
9	May 2014	Panel ESIA review meeting (Washington, D.C.) with World Bank and ESIA Consultant in partial attendance
10	August 2014	Panel final report (this document)