उत्तराखण्ड शासन

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PERFORMANCE AUDIT OF

HYDROPOWER DEVELOPMENT THROUGH PRIVATE SECTOR PARTICIPATION

REPORT OF THE
COMPTROLLER AND AUDITOR GENERAL OF INDIA

FOR THE YEAR ENDED 31 MARCH 2009

GOVERNMENT OF UTTARAKHAND

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Preface

This Report of the Comptroller and Auditor General of India contains the results of performance audit of Hydro-power Development through Private Sector Participation in Uttarakhand. The report has been prepared for submission to the Governor of Uttarakhand State under Article 151 of the Constitution of India. Government of Uttarakhand has formulated and implemented policies in October 2002 to harness its hydropower potential through the concerted efforts of both the State and the private sector.

The performance audit was conducted through a test-check of the records of the Uttarakhand Jal Vidyut Nigam Limited (Nodal Agency), physical verification of the project sites and collection and analysis of data from the Department of Energy, Uttarakhand Environment Protection and Pollution Control Board and Divisional Forest Offices of the State.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

EXECUTIVE SUMMARY

Executive Summary

With the creation of Uttarakhand in November 2000, its hydro-power potential was recognized as key to the development of the State. The Government chalked out an ambitious plan to harness its hydropower potential through the concerted efforts of both the State and the private sector. The State policy to encourage generation of hydro-power was formulated in October 2002. The prime aim was to develop the state as '*Urja Pradesh*', which would cater not just to the needs of the State but also to that of the power starved northern grid.

A performance review of the implementation of hydro-power projects through private sector participation was covering the key aspects of planning, allotment, operation, environment impact and monitoring of the projects revealed that:

Forty-eight projects with a total planned generation capacity of 2423.10 MW had been undertaken by Independent Power Producers (IPPs) in the State during 1993 to 2006, however, till March 2009, only 10 *per cent* of the projects with generation capacity of 418.05 MW were complete and operational. The prime reasons for the delays are problems associated with land acquisition, forest clearances and enhancement in project capacities. Significant areas of concern leading to non-achievement of the planned generation capacity are inadequate pre-feasibility studies for the projects, deficient project execution and primarily, absence of monitoring and evaluation of the projects by departmental authorities/nodal agency (UJVNL). More grave is the total neglect of environmental concerns, the cumulative impact of which may prove devastating for the natural resources of the State. Specific shortcomings in the State's initiative of hydropower development through private sector participation are enumerated below:

i) Pre-implementation Arrangements

- Pre-feasibility (PFR) study based on ground survey of the river basin, its topography and hydrology was to be carried by Uttarakhand Jal Vidhyut Nigam Limited (UJVNL), the nodal agency, for accurate evaluation of the hydro-power potential of a river/stream. However, significant alterations ranging from 22 *per cent* to 329 *per cent* in the capacity of 85 *per cent* of projects, raised serious doubts on the credibility of PFR studies

  [Paragraph 3.1]

- There was no specific institutional mechanism to verify the basis of capacity enhancement as variations were noticed in the norms for computing the power potential in the capacity enhancement proposals of project developers.

  [Paragraph 3.3]

- The systemic deficiencies were used by the project developers in their favour as out of 13 sample projects, nine projects were designed to be pegged just under the threshold of 25 MW to garner maximum benefits from enhanced capacity and to avoid enhanced royalty payment, which would have become due had the capacity been fixed at 25 MW or more.

[Paragraph 3.3]

- There were instances of undue extensions, without charging for liquidated damages, for implementing the projects in the garb of capacity revision, implying loss of royalty and deprivation of anticipated benefits from electricity. In addition, the Government also faced the prospect of incurring huge financial losses on account of upfront premium.

[Paragraph 3.4]

Pre-feasibility studies should be carried out with due diligence so that reliable data can be obtained for computation of power potential of projects. There is a need for standardization of norms for working out dependable water discharge, plant efficiency and other crucial inputs and therefore, a uniform and firm policy for granting extensions and terminating agreements needs to be put in place.

ii) Project Execution

- Out of total 48 projects allotted during 1993 to 2006, only 10 *per cent* projects were complete and operational after lapse of 15 years. Consequently, the envisaged power generation worth 2005.05 MW could not be achieved. As of March 2009, only two projects were likely to get commissioned in the year 2009 while nine other projects were under various phases of construction. The remaining 12 were found to have not progressed beyond the DPR/ clearance stage despite freezing of IAs.

[Paragraph 4.1]

- There was also no evidence of any punitive action being undertaken against any of the developers for defaulting on IA conditions. The liquidated damages, as a consequence of undue delays in commissioning of projects, were not recovered in a single case.

[Paragraph 4.2.1]

- Further, the failure of the nodal agency to enforce the conditions of regular and timely submission of quarterly progress reports by the project developers resulted in non-assessment of the progress of projects by the Government to avoid delays in their implementation.

[Paragraph 4.2.2]

- Negligence towards environmental and safety concerns was yet another consequence of weak monitoring by the nodal agency in ensuring adherence to prudent utility practices.

[Paragraph 4.4]

- The execution phase was also found characterized by generation losses of 10.57 million units of power worth Rs. 2.64 crore, mainly attributable to grid failure, transmission obstruction due to low voltage and hindrances by local people indicating inadequate maintenance of grid infrastructure.

[Paragraph 4.5]

A sound monitoring mechanism and evaluation system is required to be put in place to ensure that lapses on the part of IPPs during civil construction, installation of plant & machinery and operations are avoided. To fix accountability in cases of violation of conditions stipulated in the IA the Executive needs to prescribe appropriate instructions.

iii) Environment Impact

- The State's policy on hydropower projects was silent on the vital issue of maintaining downstream flow in the diversion reach (the stretch of the river from the point of diversion into tunnel to the point where it is released back into its natural stream). The physical verification of four[1] out of five operational projects, showed that river-beds down stream had almost completely dried up, the water flow was down to a trickle, and extremely inadequate for the sustenance of ecology and nearby groundwater aquifers.

[Paragraph 5.3.1]

- Given the current policy of the State Government of pursuing hydro-power projects indiscriminately, the potential cumulative effect of multiple run-of-river power projects can turn out to be environmentally damaging. Presently, 42 hydro-power projects are in operation, 203 are under construction or clearance stage, while several others are at the conceptual stage.

[Paragraph 5.3.2]

- Negligence of environmental concerns was obvious as the muck generated from excavation and construction activities was being openly dumped into the rivers contributing to increase in the turbidity of water. The projects seemed oblivious of the fact that such gross negligence of environmental concerns lead to deterioration of water quality and adverse impact on the aquatic biota.

[Paragraph 5.3.3]

- The plantation activity was highly deficient, as 38 *per cent* of projects reported hardly any plantation; posing severe hazards both for natural ecology and stabilization of hill slopes.

[Paragraph 5.4.1]

The individual and cumulative impact on the downstream river flow should be seriously considered to ensure that the projects do not result in disastrous impact on the environment. Minimum flow in the diversion reach should be computed and prescribed taking into account the groundwater recharge potential of the river, irrigation, ecology and silt load factor. It should be ensured that post-construction environmental and ecological monitoring continues and includes provisions for modifying plant operations when unacceptable impacts are observed. In accordance with the GoI guidelines, an additional 1 per cent free power from the project may be provided and earmarked for Local Area Development Fund.

[1] Rajwakti, Debal, Hanumanganga and Loharkhet

iv) Government Support

- In the absence of a well-laid down policy, land acquisition proved to be a major obstacle, derailing project development from its time schedule. Forest land clearances were received with delays ranging from 85 days to 295 days in many cases.

[Paragraph 6.1]

- In a certain case, grid infrastructure for power evacuation was not installed well in time resulting in energy losses and deferment of royalty payments to the Government.

[Paragraph 6.2]

The State Government may form a nodal authority for addressing the problems of land acquisition, forest clearance and resettlement & rehabilitation for all the projects. It is an essential requirement that reliable grid infrastructure should be made available well before the expected synchronization of the hydropower projects to avoid energy losses in absence of evacuation facilities.

Chapter 1

INTRODUCTION

Chapter 1

[Introduction]

1.1 Uttarakhand: Power Status

The State of Uttarakhand was created by carving out Kumaun and Garhwal regions out of Uttar Pradesh in November, 2000. The State is currently a net importer of power, but generates a seasonal surplus. Since its creation, the new State of Uttarakhand has been witnessing a sharp increase in energy demand. Power consumption has grown more than five times in the last seven years (2002-08). The position with regard to the sources of energy supply and consumption of energy based on use for the year 2008-09, is depicted in the charts below:

Chart : 1 Source of Energy [in Million Units (MUs)]

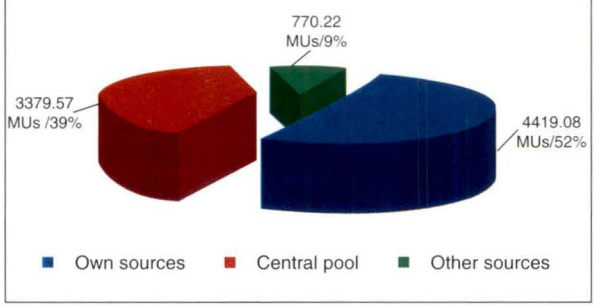
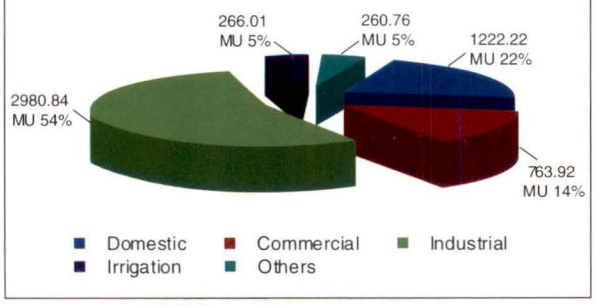


Chart : 2 Consumption of Energy [in Million Unit (MU)]



Source : Information provided by UPCL.

As is evident from the charts above, the State is able to meet only 52 *per cent* of its power needs from its own resources. The State, however, plans to become a net exporter of power by 2010 by expanding its hydro-power generation capacity and by enhancing and improving high voltage transmission systems in the State.

1.2 Hydropower policy

Uttarakhand has a hydro-power potential of the order of 20,000 MW against which only about 3,124 MW has been harnessed so far. To encourage generation of hydro-power, the Government of Uttarakhand (GoU) has formulated and implemented policies (October 2002) with the following broad objectives:

- Creation of conducive conditions for encouraging private sector participation
- Harnessing water resources in an environment friendly manner.
- Meeting the energy demand of the State/ country.
- Promotion of the all-round development of the region.
- Generation of revenue from development of its hydel resources.

GoU came out with three separate policy documents in October 2002 covering the following three categories of hydro-power projects:

a. Up to 25 MW
b. Above 25 MW to 100 MW
c. Above 100 MW

The policy for Small Hydro Projects (SHP), upto 25 MW, was later revised in January 2008,

to include power projects based on biomass, wind power, solar energy, geothermal power etc. in addition to hydro power.

Small hydro power projects up to 25 MW can be set up in the private sector without Central government's involvement. Techno-economic clearance needs to be obtained from Central Electricity Authority (CEA) only if the estimated cost of the project exceeds Rs. 500 crore and/or there are inter-state issues involved.

The salient features of the policy instruments are tabulated below:

Table: 1
Terms and conditions of hydropower policy

CATEGORY	UPTO 25 MW	ABOVE 25 MW TO 100 MW	ABOVE 100 MW
Offer period on BOOT basis	40 years from the date of award at the end of which they shall revert to the GoU	45 years from the date of award at the end of which they shall revert to the GoU	Project will be allotted for an initial period of 45 years
Application fee	Rs. 1 lakh	Rs. 5 lakh	Rs. 5 lakh
Threshold premium[1]	Rs. 5 lakh per MW[2]	Rs. 5 lakh per MW	Rs. 5 crore per project
Wheeling charges[3]	Wheeling charges would be 10% of net energy supplied at the interconnection point	Wheeling charges would be 10% of net energy supplied at the interconnection point	No mention
Royalty	Exemption for first 15 years; beyond that 18% of net energy wheeled	First 15 years - 12% of net energy wheeled; beyond that 18%	12% of electricity generated during the entire life of the project.
Incentives	No entry tax on power generation/transmission equipment and building material	No entry tax on power generation/transmission equipment and building material	No entry tax on power generation/transmission equipment and building material.
Banking of power[4]	Banking of energy within fixed period spans of 2 months	Not permissible	No mention
R & R Policy	No mention	No mention	As per R&R policy of GoU
Environment Impact Assessment (EIA)	No mention	No mention	No mention

Source: State Power Policy document.

1 The minimum premium/amount prescribed by GoU for a project.
2 Revised in Jan 2008; for projects ranging between 2 MW to 5 MW – Rs. 1 lakh per MW whereas the projects ranging above 5 MW to 25MW – Rs. 5 lakh per MW.
3 Charges raised by UPCL in lieu of transmission of electricity generated by IPPs for sale of generated energy outside the State and to captive users within the State.
4 Inter grid arrangement for surplus power generated in different states for lean season use by deficient states.

Policy for harnessing renewable energy resources (January 2008) envisages community participation in power generation through gram panchayats and societies of Uttarakhand by way of self identified projects.

Allotment of project sites for developing hydropower projects is based on open competitive bidding which provides for pre-qualification based on technical and financial parameters. Participation in the bidding process is open to private sector entities, Central power utilities, State Governments; their entities and Joint Ventures. The developers to whom the projects get allotted would have the status of Independent Power Producers (IPPs).

Forty-eight (48) projects with a total planned generation capacity of 2423.10 MW have been taken up by the Independent Power Producers (IPPs) in the state. Out of these, allotment for 34 projects was done under the erstwhile combined state of Uttar Pradesh in the year 1993. However, after the creation of the state of Uttarakhand and the announcement of the state's own power policy in October 2002, the developers of these projects entered into a fresh Implementation Agreement (IA) with the GoU.

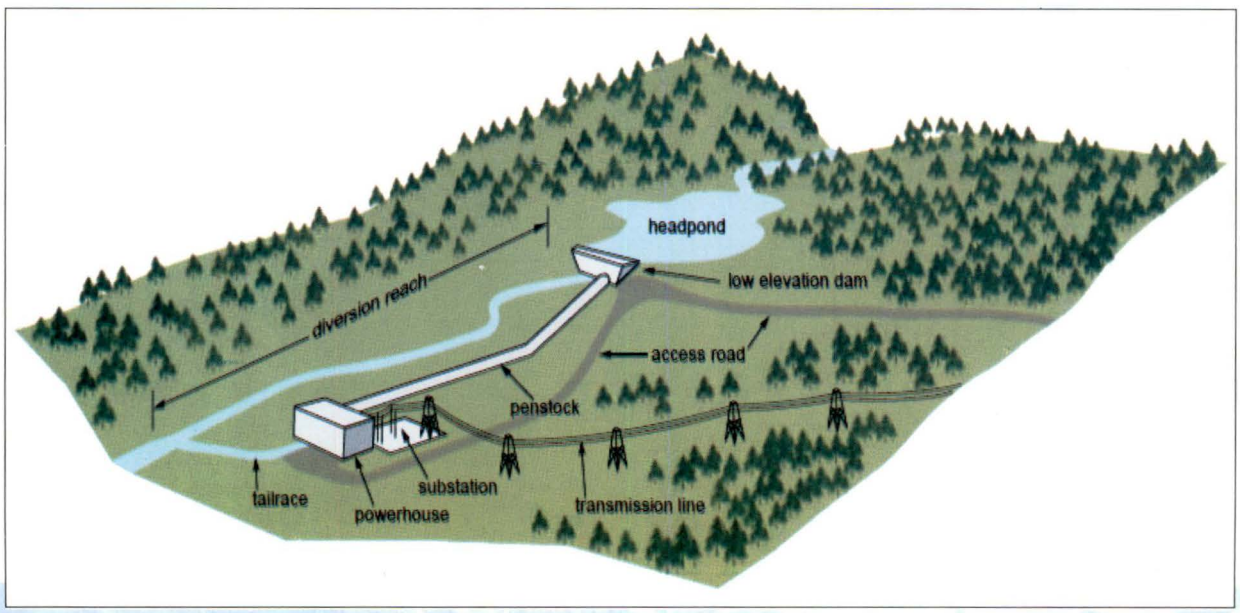
1.3 Hydropower basics

Hydropower, also known as hydroelectric power, uses water to generate electricity. When water is at a high point, it has potential energy and as it flows downhill, the potential energy gets converted into kinetic energy. The moving water in a hydroelectric plant acts on turbines to create electricity. The water flows through a turbine, making it spin. That turbine turns an electric generator, producing electricity.

1.3.1 Run-of-river (ROR) hydropower project

Run-of-river projects are different from conventional hydroelectric projects in design, appearance and impact. These power projects simply divert a portion of the flow of a stream into a turbine that generates electricity; there is no water storage other than the limited amount required to submerge the intake pipe. The water is then returned downstream without alteration. A typical run-of-river project consists of the following:

- A *weir* or small dam, to create a small *headpond*. This headpond does not store water; it merely floods an area sufficient to ensure that the intake of the penstock is under water.



- A pipe known as *penstock*, which carries water from the headpond to the turbines at a lower elevation.
- A powerhouse building containing the turbines that generate electricity from the flow of water.
- A *tailrace* channel through which the diverted water is returned to the river downstream of the powerhouse.
- Access roads to the powerhouse and the headpond.
- Transmission line from the powerhouse to the nearest transmission system.
- The section of river between the dam and the powerhouse is called the '*diversion reach*,' because significant quantities of water are diverted from this section of river.

The construction costs of run-of-river projects are significant, as are their terrestrial and aquatic impacts. When undertaken properly, with due care given to addressing environmental impacts, these projects can create sustainable green energy with minimal bearing on the surrounding environment and nearby communities.

1.3.2 Identification of ROR sites

Potential run-of-river sites must offer a significant elevation drop and sufficient water flow. A key component of the run-of-the-river plant's functionality is the height and pressure of falling water, known as "head." The power available at a site is the product of the flow volume and the head. Therefore higher the head, the less water needed to produce power. Run-of-the-river plants can be designed using large flow rates with low head or small flow rates with high head[5]. By virtue of its topographic location, Uttarakhand has a number of places endowed with substantial height and perennial water flow.

1.4 Steps to Hydropower

A hydro power project generally goes along the following steps to hydel-power generation as depicted in the diagram:

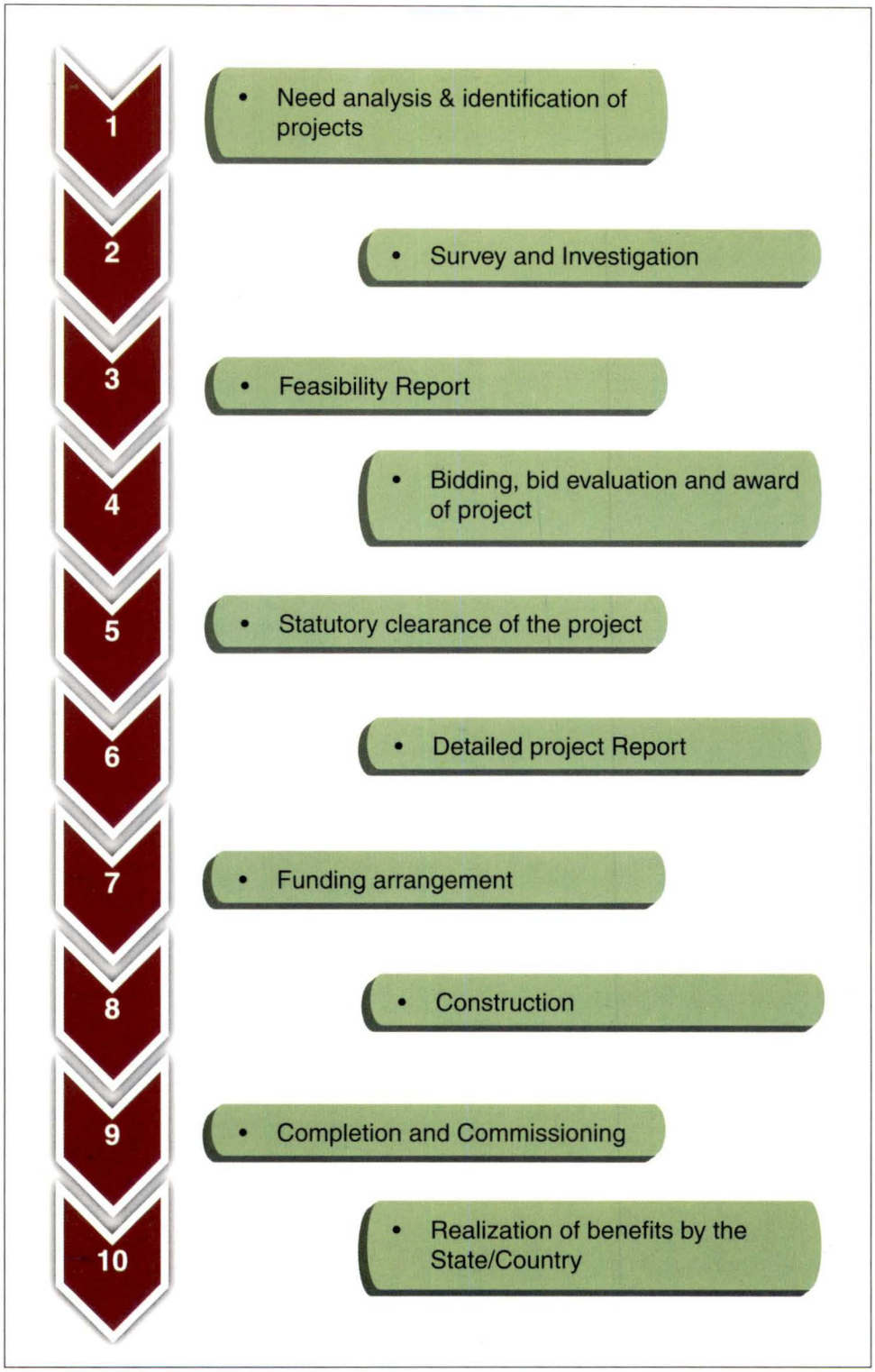
1.5 Organisational Set-up

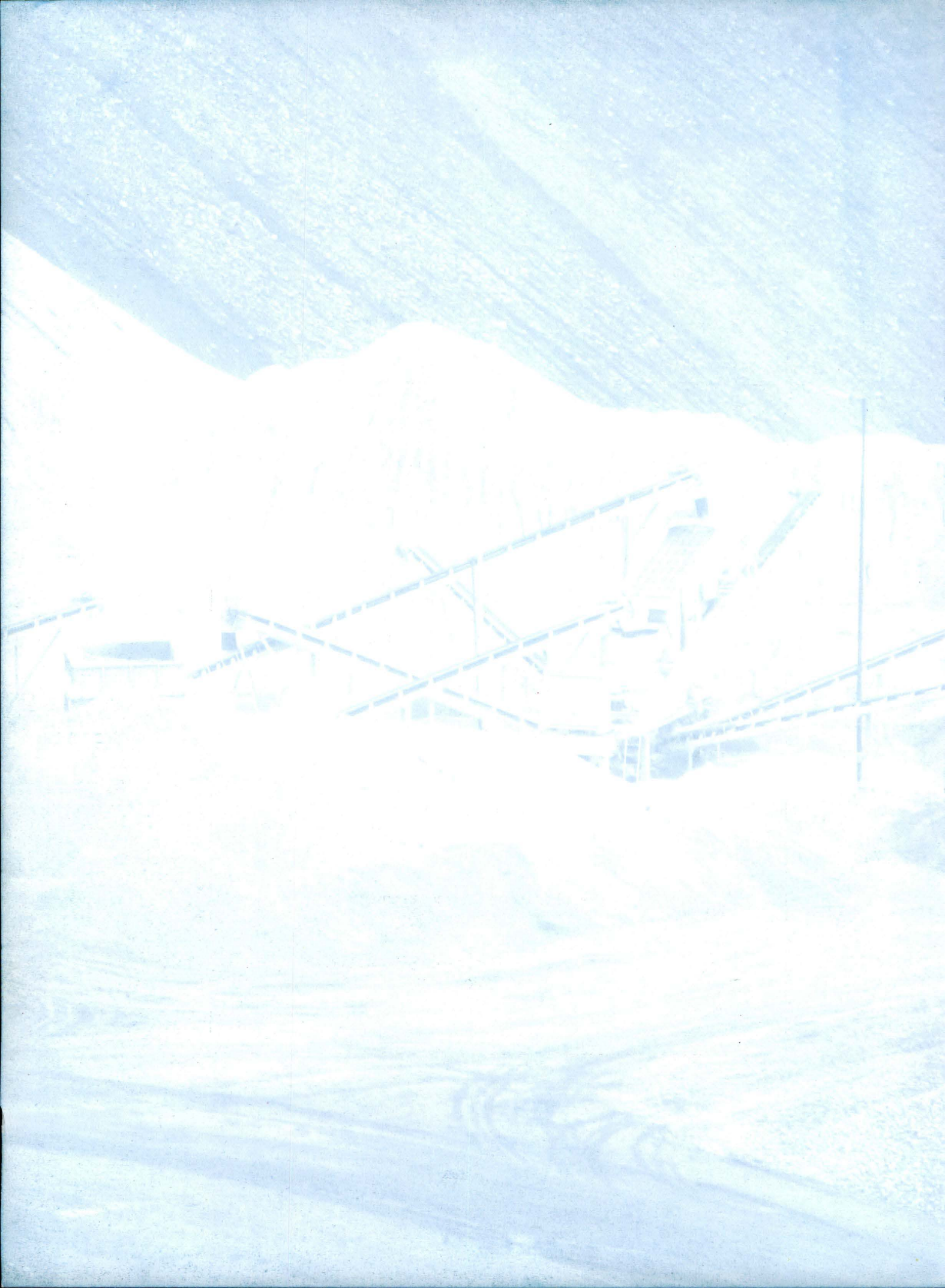
The Secretary to the Government of Uttarakhand, Department of Energy is the administrative head in the Government for formulating policies relating to hydropower development. Uttarakhand Jal Vidyut Nigam Limited (UJVNL), a Government owned company has been designated as the nodal agency for hydropower development involving Independent Power Producers[6] (IPPs). It is responsible for implementation of policies and directions given by the Government from time to time. Uttarakhand Environment Protection and Pollution Control Board (UEPPCB), constituted in 2002, has been entrusted with the responsibility of enforcing various Environmental Acts and Rules including the use of water resources for hydropower generation.

[5] A "high head" site typically has a height of over 10 feet, whereas shorter drops are referred to as "low head." Sites with drops of less than 2 feet may not support a system.

[6] Any non-Uttarakhand State Government agency, which may include private sector entity, central power utility, state government or any other government entity and their joint ventures.

Steps of Hydropower





Chapter 2

FRAMEWORK OF AUDIT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Chapter 2

[Framework of audit]

2.1 Scope of Audit

Forty-eight (48) projects with a total planned generation capacity of 2,423.10 MW have been taken up by the IPPs in the State during 1993-2006. These have been classified in the following categories:

- 37 Mini hydro projects in 'up to 25 MW' category with a total capacity of 369.10 MW
- 5 Small hydro projects in 'above 25 MW to 100 MW' category with a total capacity of 374 MW
- 6 medium hydro projects in 'above 100 MW' category with a total capacity of 1680 MW

Out of these, allotment for 34 projects was done under the erstwhile combined State of Uttar Pradesh in the year 1993. However, after the creation of the State of Uttarakhand and the announcement of the State's own power policy in October 2002, the developers of these projects entered into a fresh Implementation Agreement (IA) with the GoU.

As of March 2009, five out of 48 projects were operational; the remaining were in various stages of completion. For the purpose of performance audit, especially with regard to compliance with stipulations contained in the policy and the IA with regard to project implementation and environmental safeguards, the following audit sample was randomly selected after stratifying the entire population into three categories, as below:

Stratum-I: 4 projects out of total 5 operational projects located in Bageshwar, Chamoli & Uttarkashi districts were selected. The 5th operational project i.e. the Vishnuprayag project which is the largest being undertaken with private investment had to be excluded from the scope of the review because the audit was denied physical access to the project.

Stratum-II: 29 projects awarded under the composite State and are under progress. 6 projects located in Chamoli, Tehri & Uttarkashi were selected. However, the aspect of allotment of projects to different developers was not examined as this was done under the composite State of Uttar Pradesh.

Stratum-III: 14 projects awarded by GoU, under initial stages. 3 projects located in Chamoli & Tehri were selected.

2.2 Audit Objectives

The audit objectives were to ascertain whether:

- Identification of project sites and estimation of potential capacity was carried out with due diligence. The procedure for allotment of projects ensured selection of IPPs, technically competent in the area of hydro-power development. The regulatory process guiding project approval was sound and fool proof.
- The terms and conditions regarding timely completion and compliance with prudent utility practices, as mentioned in the Implementation Agreement (IA) were enforced during execution. Optimal utilization of generated energy was ensured through proper management and reliable infrastructure.
- Effective mechanism was in place to enforce environmental stipulations and associated directions. Impact on environment was

assessed beforehand; due preventive and protective measures to alleviate the adverse effects were implemented.

- Appropriate mechanisms were put in place to provide support for achieving the policy deliverables within the agreed time frame.

2.3 Audit Criteria

The audit findings were benchmarked against the following criteria:

- Guidelines issued by the Union Ministry of Power, Central Electricity Authority and the Central Water Commission from time to time relating to development of hydro power projects;
- Agreements entered into with the IPPs;
- Central Electricity Act 2003;
- National Electricity Policy and Plan;
- Guidelines issued by the Union Ministry of Environment and Forest; and
- State Power Policy.

2.4 Audit Methodology

The performance audit commenced with an entry conference with the Secretary, Energy in April 2009. Information with regard to the hydro power projects was obtained from UJVNL and UEPPCB and concerned Divisional Forest Offices. Records relevant to identification, allotment, approvals, statutory clearances, execution and environmental impact were scrutinized. The audit also conducted physical verification of 13 out of 48 hydropower projects, under various stages of development. **The audit team however faced constraints in accessing files relating to the Srinagar project being implemented by GVK, as these were not produced to audit despite several written requests.**

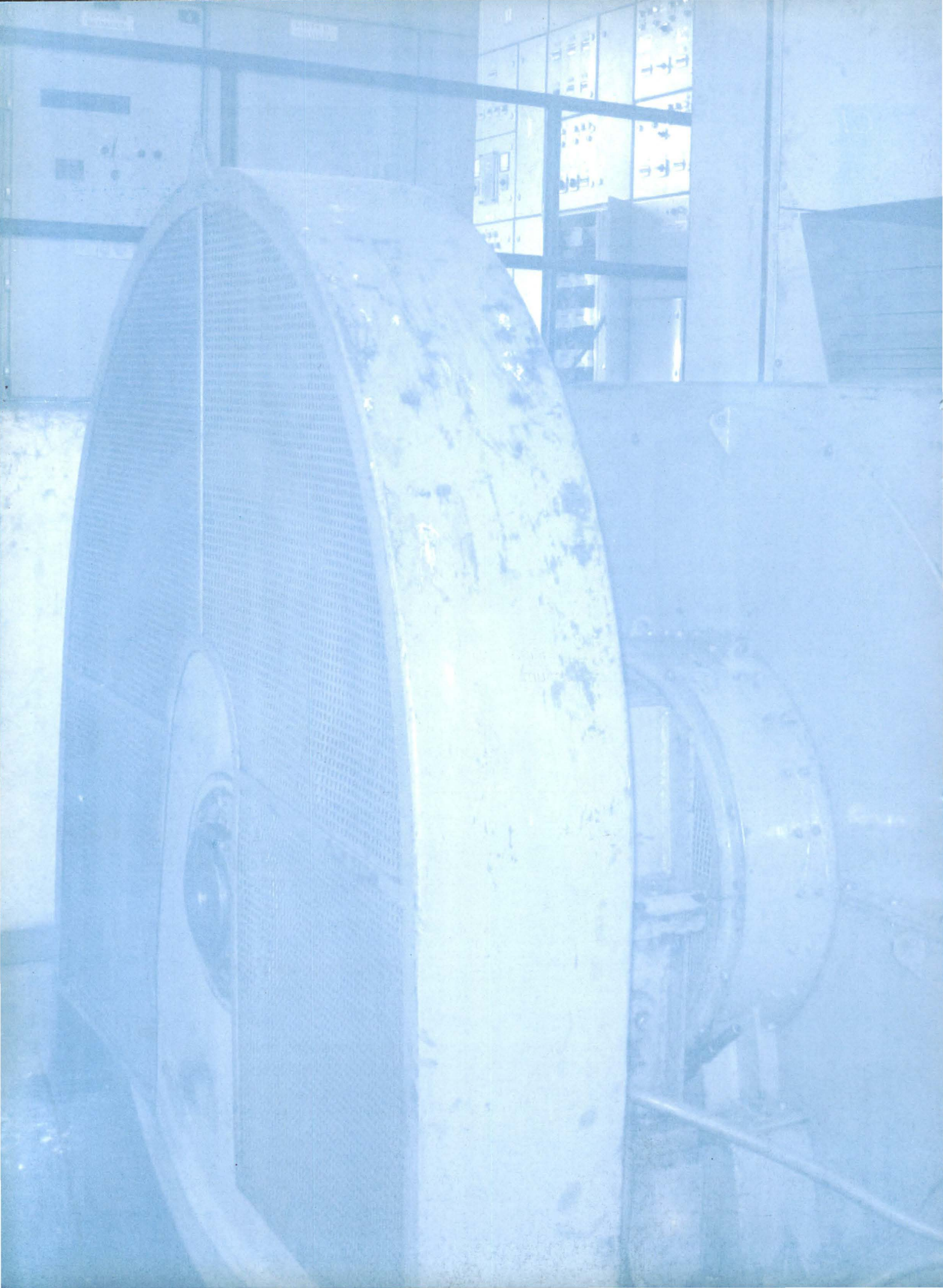
Audit findings were discussed with Principal Secretary, Energy in an exit conference on 30th November 2009 and the replies have been incorporated in the report at appropriate places.

2.5 Audit Findings

Audit findings are discussed in Chapters 3 to 6.

Chapter 3

PRE-IMPLEMENTATION ARRANGEMENTS



Chapter 3

[Pre-implementation arrangements]

Pre-feasibility (PFR) study based on ground survey of the river basin, its topography and hydrology was to be carried by Uttarakhand Jal Vidhyut Nigam Limited (UJVNL), the nodal agency, for accurate evaluation of the hydro-power potential of a river/stream. However, significant alterations ranging from 22 per cent to 329 per cent in the capacity of 85 per cent of projects, raised serious doubts on the credibility of PFR studies.

There was no technical institutional mechanism to verify the basis of capacity enhancement as variations were noticed in the norms for computing the power potential in the capacity enhancement proposals of project developers.

The systemic deficiencies were used by the project developers in their favour as out of 13 sample projects, nine projects were designed to be pegged just under the threshold of 25 MW to garner maximum benefits from enhanced capacity and to avoid enhanced royalty payment, which would have become due had the capacity been fixed at 25 MW or more.

There were instances of undue extensions, without charging for liquidated damages, for implementing the projects in the garb of capacity revision, implying loss of royalty and deprivation of anticipated benefits from electricity. In addition, the Government also faced the potential of huge financial losses on account of upfront premium.

3.1 Inadequate pre-feasibility studies

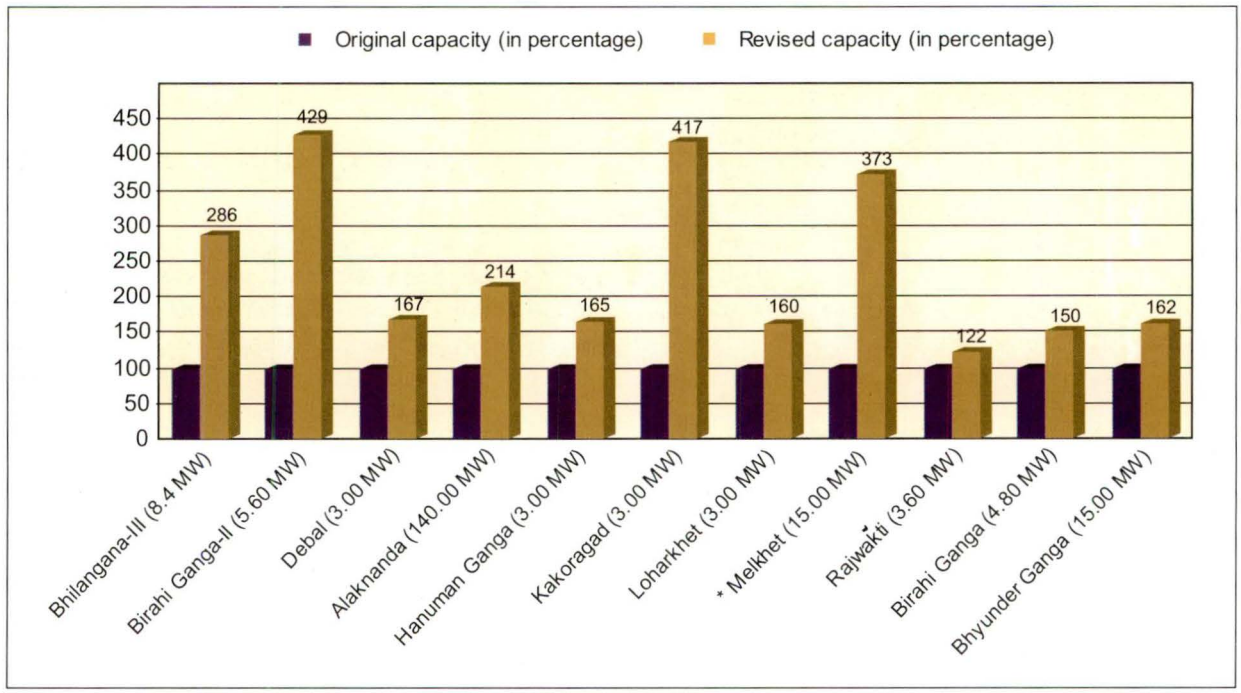
UJVNL was responsible for data collection and for conducting pre-feasibility studies relating to the 48 sites, prior to their bidding. For a proper evaluation of the hydro power potential of a river/ stream, pre-feasibility studies involving a ground survey of the river basin or sub-basin covering its topography and hydrology, is essential. The river flow volume and the elevation at a particular location are key inputs to assess hydro-power capacity and are thus critical for the identification of potential project sites.

The State's policy for hydropower development identified 48 hydro-power project sites along with their estimated potential. It was informed by UJVNL that these sites were identified by the erstwhile composite State of Uttar Pradesh based on topographical survey sheets prepared by Survey of India. However, Audit noticed that the topo-sheets were based on a scale[7] of 1:50000 or 1:25000, and therefore these do not show small differences in elevation that are required for identifying project sites and planning small hydro-power projects.

Audit scrutiny further revealed that, out of the 13 projects test checked, the capacities of 11 projects (constituting 85 *per cent* of the sample) were significantly revised in the pre-implementation stage as illustrated in the chart :

[7] Source: Manual on development of small hydroelectric projects.

Chart: 3



Source : Information extracted from the records of UJVNL.
**In case of Melkhet, the approval on revised capacity is awaited from GoU.*

This illustrates the fact that the authorities had not diligently carried out the Pre-feasibility (PFR) studies based on ground survey of the river basin, its topography and hydrology for accurate evaluation of the hydro-power potential of a river/ stream as significant alterations ranging from 22 *per cent* to 329 *per cent* in the capacity of 85 *per cent* of projects were noticed, which raised serious doubts on the credibility of PFR studies.

Audit scrutiny of records of one of the selected project-Bhilangana-III hydro project revealed that the pre-feasibility study was fraught with lapses. This project was initially estimated to have a potential of 3 MW. Based on the pre-feasibility study, the capacity of the project was enhanced to 8.4 MW. At the DPR stage; the project developer reported a variation both in water discharge (from 9.8 m/sec to 15.5 m/sec i.e. 58 *per cent* increase) and gross head (from 102 m to 229.2 m i.e. 125 *per cent* increase) following which, the capacity of the project was again enhanced to 24 MW.

As a consequence, the deficient pre-feasibility studies and enhancement of capacities of the projects post bidding and allotment led to inordinate delays in project implementation and consequent realization of benefits from the projects, as project developers had to repeat the whole process of obtaining permissions and clearances for the enhanced capacities. This has been elucidated further in **para 4.1** of this report. Very often developers proposed enhancements as a ruse to obviate the threat of penal action for delays. These enhancements and the consequent delays in project implementation also caused financial loss to the Government as discussed in para 3.4 of this report.

The State Government, while accepting the audit observations, intimated that henceforth these studies are being conducted by UIPC which has upgraded the standard of the studies and leaves little scope for variation.

3.2 Allotment of projects

3.2.1 Allotment by Government of Uttar Pradesh

Allotment of hydro-power projects in the erstwhile composite State followed a single stage clearance based on technical and financial strength of the prospective developers. A total of 34 projects got allotted in this manner in the year 1993.

Audit found that the core competence of several of the entities allotted projects by this method lay elsewhere, such as in steel production, tourism, sugar manufacture, water supply projects, general construction etc. and they had no prior experience of working in the power sector. At least two of the developers who were allotted a total of six projects could not qualify in the more rigorous selection process adopted by the GoU as discussed later in the report. One developer was rated D by a reputed financial rating company as it had defaulted on loan repayments. The slow pace of project development and implementation noticed in the case of most of the developers allotted projects under the composite State of UP, raise doubts on their technical/financial credentials and the method used for allotment.

After the creation of Uttarakhand; the State continued with the same developers by entering into fresh Implementation Agreements (IAs) with them. However, despite inclusion of certain clauses in the IAs, the Government failed to enforce these with most of the developers, as mentioned in **para 4.2.**

3.2.2 Allotment by GoU

In terms of the hydro-power policy, UJVNL was designated to undertake the bidding process for allotment of hydropower projects under the policy. The projects were to be allotted on a Build, Own, Operate and Transfer (BOOT) basis. The policy laid down the parameters for pre-qualification of bidders for the proposed projects. These were based on:

- Past experience of development, construction and operation of hydro power projects or experience in the power sector.
- Financial capacity to mobilize the required resources.

Applicants are required to qualify on both the above counts for being considered for competitive financial bidding for project allotment.

Audit scrutiny of the bidding process revealed that bid evaluation at the prequalification stage is based on three sets of criteria:

i. Technical Strength[8]

ii. Project Development Experience[9]

iii. Financial strength[10]

For pre qualification, bidders are required to meet the minimum criteria for financial strength, specified for each project. In addition, the bidder has to cross the minimum threshold score of 50 *per cent* both in aggregate and separately for technical strength and project development experience for being treated as qualified for financial competitive bidding. Financial bids are then invited from qualified applicants for premium payable upfront to the GoU. The minimum threshold premium has been kept at

[8] Based on experience in site investigation & preparation of DPR, Design & engineering, Civil construction, Equipment supply & erection, Operation & Maintenance of hydroelectric power projects/other power projects/similar projects.

[9] Based on experience in development of hydroelectric projects/other power projects/similar projects as lead developer, co-developer or equity participant.

[10] Indicative of ability to raise equity and debt for the project which is judged on the basis of Net worth, Net cash accruals, Debt raising capacity and profitability.

Rs. 5 lakh per MW for projects upto 100 MW and Rs. 5 crore per project for projects above 100 MW. The project is finally allotted to the bidder making the highest bid.

Audit analysis revealed that, despite elaborate bidding process which was carried out, with the assistance of renowned financial firms, several applicants lacking core competence in the power sector in general, not to speak of hydro-power, have been awarded projects. This primarily was a result of the presence of some clauses in the detailed qualifying criteria which proved to be open-ended. Firstly, applicants merely by tying up with a technical consultant on the basis of a MoU could obtain scores primarily on the basis of the technical strength and experience of the technical consultant. Then applicants could put together a consortium and score points on the basis of the experience and technical strength of consortium partners without their ever acquiring a significant stake in the project. Marks could also be scored on the basis of experience of any project other than hydro projects and other power projects undertaken by the applicant.

Audit further noticed that the decision to recognize diesel generator installations as power projects also allowed applicants with core interest in very different areas to qualify. Out of a total of 14 hydro-power projects which have been allotted during 2003-06, projects were awarded to applicants with core interest in sectors other than power. Details in table 2:

3.3 Deficient institutional structure for technical approval

After completion of the bidding process, the report on qualified bidders and quoted amounts is sent to the Evaluation and Recommendation Committee. This committee examines the report and finalizes the allocation of hydro-electric projects to the successful bidders. Based on the recommendations of the committee, projects are awarded to the IPPs.

IPPs are thereafter, required to prepare a Detailed Project Report (DPR) after carrying out necessary investigations and surveys. The DPR for each project is scrutinized by Technical Response Committee (TRC) of UJVNL and then forwarded to the Government for final approval after examination by the 'Urja Cell' under the Department of Energy.

Table: 2

NAME OF THE PROJECT	CAPACITY (IN MW)	PRIVATE DEVELOPER	CORE COMPETENCE	PRIOR EXPERIENCE
Mori Hanol	63.00	Krishna Knitwear	Manufacture of cotton & polyester yarn, knitted fabrics and garments	Installation & operation of diesel gen-sets
Jimbagad	7.70			
Nandakini III	19.50	Vishal Exports	Export of agro-products	Wind power
Birahi Ganga I	24.00	P.E.S. Engineers Pvt. Ltd.	Manufacture, fabrication, erection, testing and commissioning of mechanical equipment	Fabrication & erection of penstock pipes
Birahi Ganga II	24.00			
Hanol Tuni	60.00	Sunflag Iron & Steel Co. Ltd.	Automobile spring steels	In building sub-stations and laying of transmission lines.
Bhilangana-III	24.00	Polyplex Pvt. Ltd.	Manufacture of thin polyster film	Installation & Operation of diesel gen-sets

Source : Information extracted from the records of UJVNL.

Audit analysis revealed that, proposals for enhancement of capacities by developers after the allotment of sites, constitutes a gray area. It is at the stage of undertaking detailed investigations for the purpose of preparing DPRs that project developers often come up with proposals for revision of project capacity. Even though such proposals were made in a large number of projects, eleven out of total thirteen sampled projects, the procedure for approving these proposals was found to be riddled with deficiencies:

- The approval on the proposals for enhancement in capacity is given by the administrative head of the Department of Energy without the technical scrutiny of UJVNL.
- There is no technical institutional mechanism available with 'Urja Cell' to cross-verify the basis of capacity enhancement; and claims made regarding variations in water-discharge or elevation of the location are accepted on the basis of statements given by either the irrigation department or the district administration who do not have the required technical expertise in the area of hydro-potential estimation.
- The projects with capacity marginally below 25 MW pose a real problem with regard to the accuracy with which project capacity can be established. Out of the 13 projects in the audit sample, approvals have been given to nine projects, for enhancing the capacity upto 24 MW. Audit analysis further revealed that projects with a capacity of 25 MW and above are to carry out detailed environment impact assessment and have to obtain environmental clearance from the GOI. Besides, projects below 25 MW enjoy an exemption from paying royalty for the initial 15 years of operation, while projects with a capacity of 25 MW or more are liable to pay 12 per cent of net energy supply as royalty. Thus, the systemic deficiencies were used by the project developers in their favour as out of 13 sample projects, nine projects were designed to be pegged just under the threshold of 25 MW to garner maximum benefits from enhanced capacity and to avoid enhanced royalty payment, which would have become due had the capacity been fixed at 25 MW or more.

On being pointed out the Department stated that there are various factors linked with the mechanism, i.e deficiency in knowledge pool, shortage of man power, limited resources etc. However, it was assured that efforts are underway to resolve the deficiencies by strengthening the Urja Cell with adequate qualified technical man-power.

The deficiencies described above are corroborated by the audit findings witnessed in the following two projects test checked.

3.3.1 Melkhet Hydropower Project

The Melkhet Hydro-Power Project was identified with an estimated potential of 15 MW. After the creation of Uttarakhand, the GoU entered into an IA with M/s Melkhet Power Private Limited, a subsidiary of the original promoter M/s K.M. Sugar Mills Limited in April 2004.

In terms of the IA, the project developer was required to achieve financial closure and also obtain all statutory clearances and approvals for setting up the project by October 2005 (within 18 months). As the project developer failed to meet this requirement even after a lapse of 20 months, a termination notice was issued (December 2005) by the Government. In response, however, the project developer proposed capacity enhancement from 15 MW to 24 MW, based on claims of increase in water discharge from 33 cumecs to 52.2[11] cumecs and sought extension of time for attaining financial closure. However, no

[11] The change was justified on the ground that earlier the computation of average year was taken for 50% dependability and six monthly mean flow while in the revised DPR it was computed at 75% dependability and ten days mean flow.

efforts were made by the developer for complying with the other pre-implementation requirements such as getting forest clearances and completing acquisition of private land. Meanwhile, the project's management was handed over to M/s Him Urja Private Limited without obtaining prior permission from the Government and was evidence of project trading (June 2007). As per the IA, a developer can incorporate a new public/ private limited company for implementation if the aggregate equity contribution of the company/ consortium is not less than 51 *per cent* during the construction period and until two years following the commencement of commercial operation. Thus, the transfer of the project to another entity was a clear violation of the IA. The matter regarding the ownership of the project is, however, still under the consideration of the Government. The new developer also submitted a revised DPR for the project with an estimated capacity of 56 MW[12], to the Government for its approval. No decision on this issue has also been taken.

In sum, the above example highlights flaws in the planning stage of the process of allocation of hydro-power projects as no mechanism for accurately ascertaining the capacity of a project was in existence. Also, the authorities failed in taking firm punitive action against developers failing to deliver in terms of the IA. Besides, the incidence of a change in ownership of the project developer in gross violation of the IA has been allowed to linger. Eventually, the Government stood to lose both in terms of upfront premium and royalty; the upfront premium is in the ratio of the capacity and as project trading took place, the Government lost the advantage from competitive bidding if the project was initially planned for higher capacity. Moreover, liquidated damages amounting to Rs. 2.28 crore were also not charged from the project developer as a penalty for delays.

[12] By taking into account the additional head which would be available through extension of tunnel.

3.3.2 Bhyunder Ganga hydropower project

M/s Super Hydro Electric Power Private Limited entered into an IA with GoU (April 2004) for undertaking the implementation of two projects, namely Bhyunder Ganga (15MW) and Pulna Hydropower Projects (13 MW) with a total capacity of 28 MW.

Audit noticed that, as the project developer had requested for integration of the two projects which were initially identified on two different tributaries, the matter was referred to the TRC of UJVNL for assessment of the capacity of the integrated project. The TRC, based on the water discharge data for the last five years, estimated 26 MW as the installed capacity of the project. However, the project developer raised questions about the accuracy and adequacy of the water discharge data. Thereafter, another committee of UJVNL i.e. the Coordination Agency and Task Force (CATF) assessed the capacity of the project as 24.3 MW, based on the following:

- Water discharge data for the last 25 years.
- Factoring of the need of 0.8 cumecs of water discharge for the Pandukeshwar project, located in the downstream of the combined project. Based on the above a project capacity of 24.3 MW was approved by the GoU in October 2005 and a supplementary IA was entered into with the project developer in November 2006. Audit analysis revealed that the whole process was clearly manipulated to keep the project capacity below 25 MW and the following irregularities were evident:
- All technical aspects had initially been examined by the TRC, but the Government decided to follow the recommendations of another committee.

- The water requirement for the Pandukeshwar project could very well have been met from the tailrace discharge of this project.
- The combined efficiency of plant and machinery viz. turbines, generator and transformers was taken at 80 *per cent*, which was less than the norms (84 *per cent* to 87.9 *per cent*) laid by the CEA. Even considering an efficiency of 84 *per cent* the project capacity would have been 25.51 MW[13].

In sum, besides causing an extraordinary delay in the commencement of the project, the Government also lost on account of royalty, which would have accrued for first 15 years of project operation on account of the capacity enhancement allowed in respect of the project.

The State Government replied (November 2009) that the violations have been taken into notice and assured that due care would be taken in future to deal with such kind of approvals.

3.4 Financial loss in terms of upfront premium

For the 14 projects awarded by GoU, the capacity assessment through feasibility study got grossly altered (varying from 20 to 604 *per cent*) in the DPR stage. Eventually, the Government faced the prospect of incurring huge financial losses on account of upfront premium. The status with regard to projects allotted by GoU has been tabulated in table 3.

Audit noticed that in the DPR stage, the capacities of almost all projects have undergone significant changes. However, in terms of provisions[14] formulated by the Government, the project developers are required to pay an additional premium of only Rs. 5 lakh per MW for the additional capacities rather than the premium /pro-rata premium quoted in their initial bids. Audit noticed that:

- As the bids were invited for relatively low capacity, it fetched less upfront premiums.
- In three out of nine cases of capacity revision alone, where Government had fixed the additional premium, it lost a premium of Rs. 56.74 crore on account of the difference between the additional premium paid by project developers and premium calculated on the pro-rata basis.
- The losses on this account are bound to multiply once additional premiums are fixed for other projects where enhancements have been approved or proposed.
- Owing to the substantial changes in the planned capacities, the project costs would also rise steeply requiring reassessment of the financial strength of the selected developers to undertake the project.

In conclusion, the instances of undue extensions, without charging for liquidated damages, for implementing the projects in the garb of capacity revision, implied potential loss of royalty and deprivation of anticipated benefits from electricity. In addition, the Government also faced the prospect of incurring huge financial losses on account of upfront premium.

[13] 24.3*84/80 = 25.5

[14] For the projects falling under 25 MW: Rs. 5 lakh per MW for the additional capacity, based on water discharge increment
For the projects falling between 25 MW to 100 MW after enhancement: Rs. 5 lakh per MW for the additional capacity
For the projects above 100 MW after capacity enhancement: Based on a formula

Table: 3

STAGE	NAME OF THE PROJECT	INITIAL CAPACITY (MW)	UPFRONT PREMIUM (IN CRORE)	ENHANCED CAPACITY (MW)	% ALTERATION	ADDITIONAL PREMIUM AS PER THE PROVISIONS (IN CRORE)	ADDITIONAL PREMIUM ON PRO-RATA BASIS (IN CRORE)
Under construction	Bhilangna III	8.40	0.85	24.00	186	1.18	1.58
	Rambara	24.00	12.48	76.00	217	2.60	27.04
	Phata Byung	10.80	5.67	76.00	604	2.33	34.23
DPR approved	Singoli Bhatwari	60.00	30.62	99.00	65	Yet to be paid	19.90
	Alaknanda GMR	140.00	42.12	300.00	114	Yet to be paid	48.14
Approval stage	Birahi Ganga II	5.60	1.82	24.00	329	Yet to be paid	5.98
	Nandakini III	5.60	0.98	19.50	248	Yet to be paid	2.43
	Hanol Tuni	50.00	2.60	60.00	20	Yet to be paid	0.52
	Birahi Ganga I	3.80	1.35	24.00	532	Yet to be paid	7.18
DPR under preparation	Mori-Hanol	63.00	23.31	--	--	--	--
	Boghudhiyar Sirkaribhyol	170.00	6.50	--	--	--	--
	Mapang Bogudhiyar	200.00	6.05	--	--	---	--
	Urthing Sobla	340.00	6.12	--	--	--	--

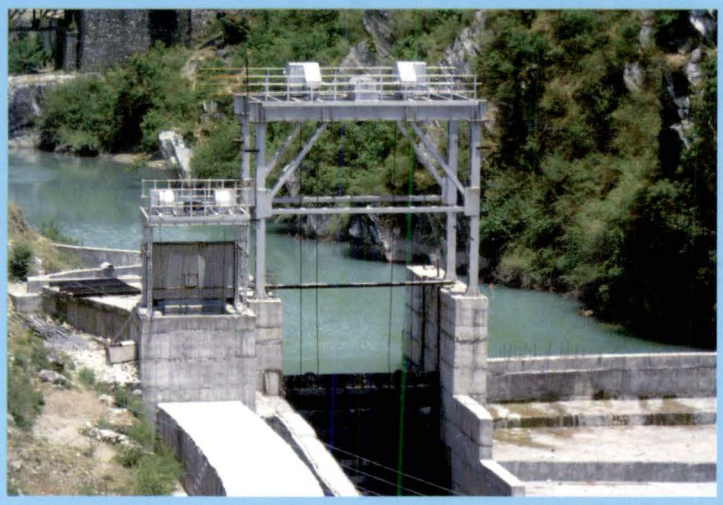
Source: information provided by UJVNL

Recommendations

- *Pre-feasibility studies should be carried out with due diligence so that reliable data can be obtained for computation of power potential of projects.*
- *Sufficient data on stream flows and biota should be collected for a reasonable period of time prior to construction and this baseline data should be used in planning and mitigation processes.*
- *On account of the implications for upfront premiums and financial capabilities of the developers, the Government should consider and frame guidelines for dealing with all such cases where huge increases in capacities are proposed. A uniform and firm policy for granting extensions and terminating agreements needs to be put in place.*

Chapter 4

PROJECT EXECUTION



Chapter 4

[Project execution]

Out of total 48 projects allotted during 1993 to 2006, only 10 per cent projects were complete and operational after lapse of 15 years. Consequently, the envisaged power generation worth 2005.05 MW could not be achieved. As of March 2009, only two projects were to get commissioned in the year 2009 while nine other projects were under various phases of construction. The remaining 12 were found to have not progressed beyond the DPR/clearance stage despite freezing of IAs.

There was also no evidence of any punitive action being undertaken against any of the developers for defaulting on IA conditions. The liquidated damages, as a consequence of undue delays in commissioning of projects, were not recovered in a single case.

Further, the failure of the nodal agency to enforce the conditions of regular and timely submission of quarterly progress reports by the project developers resulted in non-assessment of the progress of projects by the Government to avoid delays in their implementation.

Negligence towards environmental and safety concerns was yet another consequence of weak monitoring by the nodal agency in ensuring adherence to prudent utility practices.
The execution phase was also found characterized by generation losses of 10.57 million units of power worth Rs. 2.64 crore, mainly attributable to grid failure, transmission obstruction due to low voltage and hindrances by local people indicating inadequate maintenance of grid infrastructure.

4.1 Present Status of Projects

Forty-eight (48) projects were allotted during 1993 to 2006 for development through IPPs. Out of these, only five projects have been completed and are operational. The remaining 43 projects are at various phases; 23 projects are in the DPR submission/approval stage, eight projects are in clearance stage and 12 projects are under construction as of March 2009.

Table : 4

YEAR OF ALLOCATION	NO. OF PROJECTS	ESTIMATED POTENTIAL (MW)	OPERATIONAL PROJECTS	PRESENT STATUS		
				DPR STAGE	CLEARANCE STAGE	UNDER CONSTRUCTION STAGE
Pre-bifurcation						
Between 1993 to 1998	34	1,038.50	5	11	7	11
Post-bifurcation						
2003	2	84.00	-	1	-	1
2004	4	950.00	-	4	-	-
2006	8	350.60	-	7	1	-
Total	**48**	**2,423.10**	**5**	**23**	**8**	**12**

Source: Information provided by UJVNL.

Of the 34 projects, allotted during the composite state of U.P., revised IA/Project Development Agreements (PDAs) were signed by the GoU with the project developers to make them accountable for timely completion. However, only five projects were found to be operational till March 2009. Out of the remaining 29 hydro projects, the date of commercial operation was kept as October 2008 for 23 projects; however none of these projects could achieve the target date of commissioning. Only two projects were likely to get commissioned in the year 2009 while nine other projects were under various phases of construction. The remaining 12 were found to have not progressed beyond the DPR/clearance stage despite freezing of IAs.

Only 10 *per cent* projects having a total capacity of 418.05 MW are complete and operational (year 2008-09) as against the envisaged targeted potential of 2423.10 MW. Delays of over four years were noticed in commencing work in 31 *per cent* of the projects; prime reasons for the delays being problems associated with land-acquisition, forest clearances and enhancement in project capacities.

4.1.1 Status of sampled projects

The details of 13 projects selected for detailed audit scrutiny are presented in the table 5.

Table: 5

SL. NO.	STAGE	NAME OF PROJECT SELECTED FOR AUDIT	CAPACITY (IN MW)	YEAR OF ALLOTMENT	DATE OF IA	APPROVAL OF DPR
1.	Operational stage	Rajwakti	4.40	1993	Aug 1999	1999
2.		Debal	5.00	1993	April 2004	1996
3.		Hanuman Ganga	4.95	1993	April 2004	1997
4.		Loharkhet	4.80	1993	April 2004	2005
5.	Clearance/ Construction stage	Agunda Thati	3.00	1993	April 2004	2006
6.		Birahiganga	7.20	1993	April 2004	2004
7.		Kakora Gad	12.50	1993	--	Submitted in Dec 06
8.		Melkhet	56.00	1993	April 2004	Submitted in Feb 08
9.		Bhyunder Ganga	24.30	1993	April 2004	2006
10.		Srinagar (GVK)	330.00	1993	Feb 2006	2000
11.	Initial Stage	Birahi Ganga-II	24.00	2006	--	Submitted in Nov 08
12.		Bhilangana- III	24.00	2003	Jan 2007	2006
13.		Alaknanda (GMR)	300.00	2004	--	2008

Source: Information provided by UJVNL.

4.2 Failure to enforce Implementation Agreement

The Implementation Agreement, made between the GoU and the IPP, specifies the terms and conditions for undertaking the implementation of the project. The IA is made after the IPP has carried out necessary investigations and confirmatory surveys, prepared and submitted the DPR and is convinced of obtaining statutory clearances and other approvals.

The IA stipulates a time period for achieving financial closure[15] and for commencing commercial operations and specifies a Commercial Operation Date[16] (COD) for the project. The IA also lays down the consequences of not complying with the stipulations regarding achievement of financial closure and commercial operation which in the case of the former is termination of the IA itself and in the case of the latter is a liability to pay liquidated damages to the Government. Besides, the IPP is also responsible for submitting quarterly progress reports in respect of obtaining clearances and approvals; achieving financial closure and progress of works relating to the project.

4.2.1 Non-levy of liquidated damages

Out of the 13 projects included in the audit sample, IA had been signed with the developers in the case of 10 hydro projects. These IAs specified the Commercial Operation Date (COD) of each of these projects. Scrutiny of relevant records revealed that four out of the 10 projects were able to start power generation within the stipulated time. In the case of three projects, the COD is still due. In the balance three projects, representing 30 *per cent* of the population, commercial operations have not been achieved by the stipulated COD.

As per the IA, liquidated damages, amounting to Rs. 2.54 crore as on August 2009 were to be charged from the project developers, as tabulated in table 6.

However, audit noticed that, there was no evidence of any punitive action being undertaken by the Government against any of the developers for defaulting on IA conditions. The liquidated damages, as a consequence of undue delays in commissioning of projects, were not recovered in a single case despite the fact that even the IAs gave no scope of discretion on relaxation or exemption from paying of liquidated damages. This underlined the Government reluctance in dealing with consistently defaulting developers.

4.2.2 Inadequate monitoring of progress of projects

Policy document mandated UJVNL to carry out various checks including data collection and monitoring during the execution of the projects. Due to the shortage of staff the nodal agency was unable to fulfill its mandate.

Audit noticed that, no measures were taken by UJVNL to enforce the clause in the IA mandating submission of periodical progress reports by project developers. In the absence of these reports, the Government was not in a position to assess the actual status of projects and monitor project implementation.

Thus, the failure of the nodal agency to enforce the conditions of regular and timely submission of quarterly progress reports by the project developers resulted in non-assessment of the progress of projects by the Government to avoid delays in their implementation.

[15] The date, on which the IPP has immediate access to the funding by the lenders, given by way of loans, debentures, bonds, security agreements and other debt instruments.

[16] The date on which the project is capable of delivering power on a regular basis after having successfully completed the commissioning tests.

Table: 6

NAME OF THE PROJECT	DATE OF IA	FINANCIAL CLOSURE	SCHEDULED COD	ACTUAL COD	OVERRUN PERIOD	LD AS PER IA (PER DAY)	TOTAL LD (IN LAKH)	SUPPLE-MENTARY IA
Agunda Thati	28.4.04	Feb 2006	27.10.08	Yet to achieve	308 days	5,000	15.40	--
Birahi Ganga	28.4.04	Feb 2006	27.10.08	Yet to achieve	216 days	5,000	10.80	June 2009
Bhilangana-III	25.1.07	March 2007	24.7.11	--	--	80,000	--	--
Melkhet	28.4.04	Not achieved	27.10.08	Yet to achieve	308 days	74,000	227.92	--
Bhyunder Ganga	28.4.04	Applied for extension	31.03.11 as per supp. IA	--	--	74,000	--	Nov 2006
Srinagar[17] (GVK)	08.2.06	Not achieved	--	--	--	No mention	--	--
Total :							254.12	

Source : Information obtained from UJVNL.

The specific case of the Agunda Thati project is discussed below to highlight the adverse repercussions of the inadequate monitoring of project implementation by the GoU and UJVNL.

Agunda Thati Hydropower Project

The initial allotment of Agunda Thati project was made to M/S Gunsola Hydro Power Generation Private Limited in 1993. The DPR for the project was approved by the Uttar Pradesh Government for an installed capacity of 3 MW. After the bifurcation of the State and creation of Uttarakhand, an IA was entered into with the same project developer by the GoU in April 2004. A fresh DPR was also submitted by the project developer for approval in April 2005. During the technical vetting of the DPR by UJVNL, it was noticed that significant changes have been made in the project design without seeking prior permission. It was also found that civil construction work had also been commenced on a changed project site. The unauthorized changes made by the project developer included:

- Change in geographical coordinates of the project site from 78-39' longitude to 78-38' longitude
- Change in project site from 'Thati' to 'Buda Kedar'
- Change in water source from the river 'Dharamganga' to river 'Balganga'
- Increase in water discharge from 3.45 cumecs to 10 cumecs
- Reduction in head from 172 m to 50.43 m

Audit analysis revealed that, the changes appear to have been planned with the motive of gaining from the combined water discharge of two rivers (river Dhramganga being a tributary of river Balganga). Besides, the above mentioned changes also involved an infringement of UJVNL's project Balganga-I located on river Balganga. The revised DPR submitted by the developer was however, approved (April 2006) on the basis of the justification given by the developer that the changes were necessitated

[17] The related documents were not provided to audit, except the copy of RIA.

on account of a cloud burst that took place in 2001. However, the justification lacks weight as the occurrence of the cloud burst and the consequent need for the changes were not brought to the notice of the GoU at the time of entering into the IA in April 2004.

The following shortcomings in the execution of the above project highlight the absence of monitoring project implementation by the responsible authorities:

- Both the nodal agency and the Government being unaware of the status of projects being implemented.
- The project developer without any intimation to and approval from the nodal agency and the Government not only unilaterally changed the project site and design but also commenced civil construction at the changed site.
- It was only to attain financial closure and mobilize loans from HUDCO that the project developer approached the Government for seeking approval for its revised DPR.
- The Government instead of taking stern action against project developer decided to approve the revised DPR on a ground that was found to be unjustified.

4.3 Unreasonable terms in the Restated Implementation Agreement (RIA)

The Srinagar hydropower project on river Alaknanda with a capacity of 330 MW was conceptualized in the 1990s under the composite State of Uttar Pradesh. The project which was initially started as an Irrigation department project was first allotted to a JV of a Kolkata based company and a foreign company. The project, thereafter, moved to a Tata company which acquired controlling stake in the JV and finally to GVK. On account of the changes in the status of the developer and the creation of the new State of Uttarakhand, a Restated Implementation Agreement (RIA) was entered into (February 2006) between the GoU, the Government of Uttar Pradesh and GVK's Srinagar Hydro Power Company for execution of the said project.

Audit scrutiny of the terms and conditions stipulated in the RIA revealed that the project developer had been given terms that were more favourable than the terms of the standard IA being entered into by the GoU with other project developers allotted projects of over 100 MW capacity. Few issues of the unreasonable terms are as follows:

- There is no provision for liquidated damages on account of delays; as per clause 6.1 of the RIA, the project developer is required to commence commercial operations within 13 years from the effective date i.e. Feb 2006. This period can be extended in case of delay.
- As per clause 8.1 of the RIA, if required, the GoU shall provide for the purpose of facilitating financial closure of the project, suitable undertaking for forest land and mortgage facility in respect of non-forest land in favour of the lenders providing financial assistance to the project.
- Clause 18.2 of the RIA stipulates that the project shall operate as a "must run plant" utilizing its full potential. If the company is required to release water from the project dam by the GoU which would have otherwise been utilized for power generation and any other direction from the GoU affecting generation, the GoU will have to pay to the company for the resultant revenue loss.
- The ownership of the project entity has been allowed to change even though the policy is to prohibit any changes till the project comes into commercial operation.

The rationale for grant of special terms to the project developer in this case could not be ascertained during Audit as **files relating to the**

project were not provided despite several written requests. The time taken for project implementation to commence in this case was also found to be unusually long but due to absence of access to project records reasons for the same could not be analysed in audit.

Delays of such magnitude not only lead to escalation of project costs which will push up tariffs but also delay benefits from the project from being realized. The special terms offered in this case opens the risk of similarly placed developers seeking similar concessions at some stage of their project implementation.

On being pointed out, the State Government emphasized the need to include provision relating to 'Must-run-project' in all the IAs in future to attract more private investment in the sector.

4.4 Non-adherence to Prudent Utility Practices[18]

As per the conditions of the IA, the project developer was required to design, construct and complete the project in accordance with applicable laws, sound engineering and prudent utility practices. UJVNL was entrusted with the job of monitoring and supervision of the project works. Out of five operational projects, four were physically inspected by the audit team. Deficiencies noticed are discussed below:

i. During the physical inspection of the Rajwakti power project (June 2009), it was found that the power channel[19], in a length of 150 meters was left uncovered. This was a violation of standard provisions of the DPR. Besides, it was also a safety hazard for the local population.

[18] The internationally accepted practices, methods, techniques and standards for installation, operation and maintenance of the project taking into account physical conditions, safety and efficiency.

[19] Power channel is meant to supply water from de-silting tank till the turbines.

Rajwakti : Uncovered power channel

ii. A minimum water flow from the weir/barrage needs to be ensured for downstream requirements. Due to the trench type weir designs of Loharkhet and Hanuman Ganga hydropower projects, the free river flow got absolutely thwarted; the water passage in the diversion reach was possible only in situations of overflow during heavy rains. Thus the scope for downstream flow during the lean season when the demand for water is at its peak was entirely eliminated. The environmental aspects of non-maintenance of a minimum downstream flow have been elaborated in Chapter 5 on 'Environment Impact'.

Loharkhet : Trench type weir

iii. The IA envisaged that the project developer shall ensure proper safety measures during implementation of the project. The preventive plan for safety included:

- Safety check of all installed devices;
- Ensuring of canal/river safety ;
- Fencing of moving parts;
- Constitution of safety committees

Audit scrutiny revealed that safety measures were inadequate in Debal and Rajwakti hydro power projects. The absence of fire fighting equipment and fencing/covering of moving parts like turbines, coupled with insufficient technicians and skilled staff were issues of grave concern and need to be urgently addressed. Inadequate attention to safety measures posed a security hazard for the personnel working in the project.

Negligence towards environmental and safety concerns by the IPPs, as illustrated above, was yet another consequence of weak monitoring by the nodal agency in ensuring adherence to prudent utility practices.

4.5 Loss of Energy

Scrutiny of the test checked projects in operation, revealed that generation losses of 10.57 million units of power worth Rs. 2.64 crore had taken place during 2005-2009. The losses were mainly attributed to grid failure, transmission obstruction due to low voltage and hindrances by local people, indicating inadequate maintenance of grid infrastructure. The details are shown in table 7.

Table: 7

NAME OF PROJECT	SHUT-DOWN HOURS *	PERIOD	UNIT LOSS	RATE PER UNIT (RS.)	AMOUNT OF LOSS (RS. IN LAKH)
Hanuman Ganga	3,297.98	2005-09	90,02,562	2.50	225.06
Loharkhet	682.68	2008-09	15,71,304	2.50	39.28
Total :	3,980.66		1,05,73,866		264.34

Source: Information obtained from project authorities.
** Excludes annual accepted limit of 400 hours.*

Recommendations

- *A proper monitoring mechanism needs to be put in place to ensure that lapses on the part of IPPs during civil construction and operations are avoided.*
- *Executive should prescribe procedure to fix accountability in cases of violation of conditions stipulated in the Implementation Agreements.*
- *Reasons behind delays in implementation of hydro projects should be thoroughly examined so as to put in place a more responsive monitoring mechanism for avoiding delays in upcoming projects.*

Chapter 5

ENVIRONMENT IMPACT

Chapter 5

[Environment impact]

The State's policy on hydropower projects was silent on the vital issue of maintaining downstream flow in the diversion reach (the stretch of the river from the point of diversion into tunnel to the point where it is released back into its natural stream). The physical verification of four[20] out of five operational projects, showed that river-beds down stream had almost completely dried up, the water flow was down to a trickle, and extremely inadequate for the sustenance of ecology and nearby groundwater aquifers.

Given the current policy of the State Government of pursuing hydro-power projects indiscriminately, the potential cumulative effect of multiple run-of-river power projects can turn out to be environmentally damaging. Presently, 42 hydro-power projects are in operation, 203 are under construction or clearance stage, while several others are at the conceptual stage.

Negligence of environmental concerns was obvious as the muck generated from excavation and construction activities was being openly dumped into the rivers contributing to increase in the turbidity of water. The projects seemed oblivious of the fact that such gross negligence of environmental concerns lead to deterioration of water quality and adverse impact on the aquatic biota.

The plantation activity was highly deficient, as 38 per cent of projects reported hardly any plantation; posing severe hazards both for natural ecology and stabilization of hill slopes.

To ensure sustainable development and optimal use of natural resources, environmental considerations are required to be integrated in planning, designing and implementation of development projects.

Understanding the consequences of development and forecasting its impact on the basic life support system- land, water and air- is referred to as Environmental Impact Assessment (EIA). It also encompasses impacts on the ethnic diversity, socio-culture and socio-economic environment including displacement, resettlement and rehabilitation of human societies where development activities are undertaken. The objective of EIA is to foresee and address potential environmental problems/ concerns at an early stage of project planning and design.

5.1 Insufficient environmental clearances

Under the existing policy regime, hydropower projects with a capacity of more than 25 MW are referred to GoI for environmental clearance. Projects with a capacity of less than 25 MW, only need the consent of UEPPCB to establish and then to operate. The Board after inspection, issues a No Objection Certificate (NOC), valid for three years subject to following conditions:

- Monthly report regarding establishment of machinery, equipment, pollution control accessories and air pollution control facilities

[20] Rajwakti, Debal, Hanumanganga and Loharkhet.

at the project site shall be submitted to the Board.

- Hydel projects will not start generation unless the project is cleared by the Board in respect of water and air pollution.
- The project authorities shall ensure the minimum discharge of water to flow in the natural water course of the river in order to protect and preserve aquatic life.
- Project shall also obtain necessary clearances from the Forest Department, the Fisheries Department, Agriculture Department and other related departments.
- Provisions for proper muck disposal shall be made and adhered to.
- Prior permission for cutting down of trees, if necessary, will be obtained from concerned Divisional Forest Office.

Audit found that out of eight projects[21], forming part of the audit sample, which were under construction/operation, the consent to establish the projects from the Board was obtained only by five. Besides, consent to operate was only obtained by one project (Debal) even though four projects were operational. Thus 75 *per cent* of the projects were being operated without the consent of UEPPCB. It was also noticed that

- The Board failed to enforce key conditions mandatory for certification such as submission of monthly reports, proper muck disposal and ensuring a minimum downstream flow.
- No penal action was initiated against project developers who were operating without proper consent and were blatantly defying environmental provisos.
- No regular inspections were being carried by Board personnel except during the mandatory inspection required for issuance of NOC.

[21] Hanuman Ganga, Srinagar (GVK), Rajwakti, Debal, Birahiganga, Bhilangana-III, Agunda Thati & Loharkhet.

5.2 Impact

Hydro-power projects carry direct and indirect environmental impact on various environmental elements, mainly aquatic, terrestrial, geophysical and human, both during the construction and operational phase. The impact due to the construction of hydro-power projects commences right from the start of exploration activities, construction of adit tunnels, head race tunnels and approach roads and may continue up to the stage of commercial operation of the project. The nature and extent of impact however, varies at different stages of project development. The environment impact assessed during construction and operation phase, are categorized into three basic types as per details given in the chart.

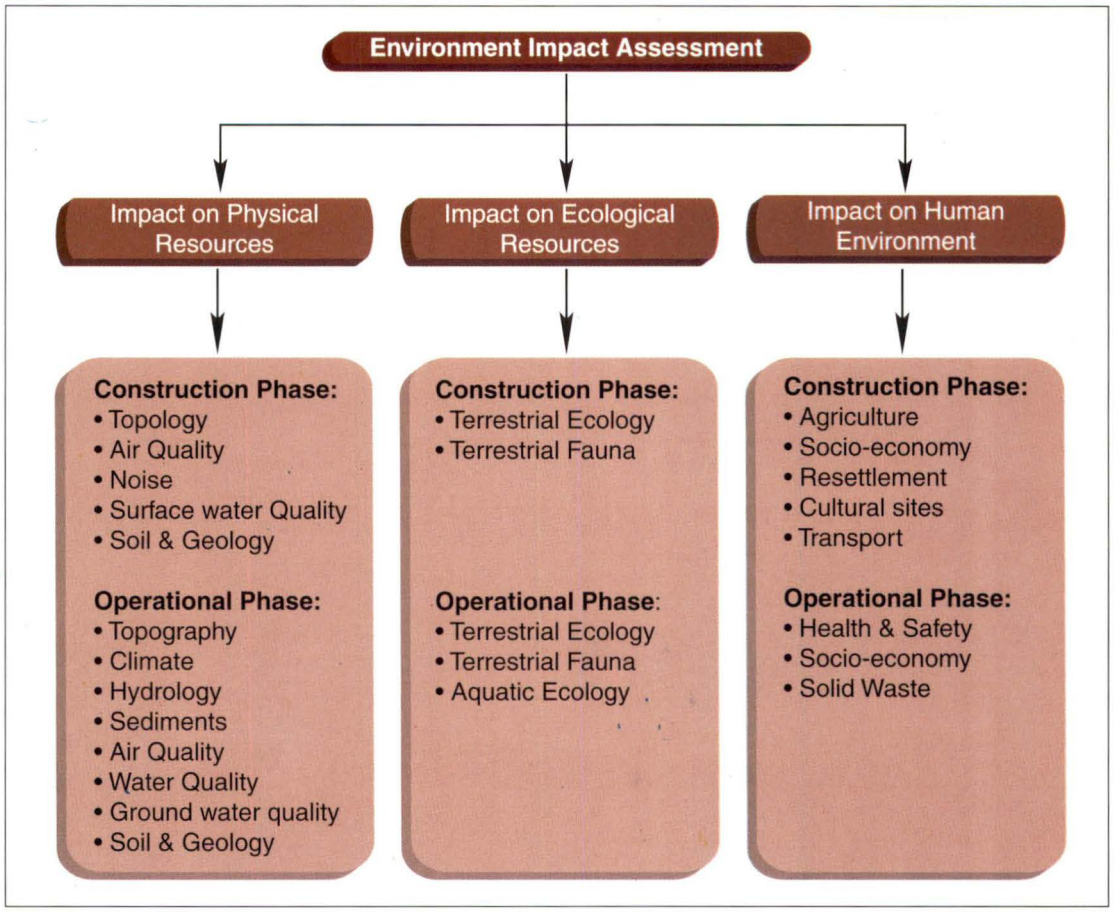
Based upon an evaluation of magnitudes of impacts of a project, an Environmental Management Plan (EMP) is formulated for each project, specifying protective and mitigation measures.

Audit analysis revealed that, the GMR project planned on river Alaknanda assessed the environmental impact through a detailed survey; EMP involving a financial outlay of Rs. 31.90 crore has been chalked out for preservation of natural ecosystems and mitigation of biotic and abiotic pressures.

5.3 Damaging impact on Aquatic Ecosystems

A run-of-river project involves diverting the river into a tunnel. The place from where the river is diverted into a tunnel, to the point where it is released back into its natural stream tends to have very little water, especially during the lean season. This alteration of the downstream flow inolves the following impact[22] with varying magnitude:

[22] http://www.sandrp.in/hydropower/crtlenv_issue



- Diversion of huge quantities of water by hydro power projects minimises water flow; even drying up the main river bed during lean season.
- Irrigation problems may arise for farming and cultivation which depend on river waters.
- Gangetic Rivers erode the bulk of their sediments from upstream areas in the Himalayas and deposit it in the alluvial plains which is critical for agriculture in the plains. Due to trapping of silt at barrage sites, the downstream areas will be deprived of huge amounts of sediment.
- Reduction in sediment load in the river can result in increased erosion of river-banks and beds. As the trapping of silt will considerably reduce the sediment supply in the river-waters, the river will behave as 'hungry waters' scouring sediments from riverbeds and river banks downstream to restore the natural sediment levels of the water.
- Stoppage of ground water recharge in the downstream regions.
- Salinity ingress due to stoppage of fresh water flow, which can not only spoil the existing groundwater quality in the region but can also affect the land near the river banks.
- Decreased volume of water is a cause of pollution of water streams because of low dilution. It carries potential for water-borne diseases.
- Destruction of riparian vegetation in and adverse effect on fisheries.

In addition, adverse impact on the water quality is also likely from inappropriate disposal of

muck[23], effluents from crushers and other sources and sewage from labour camps and colonies. The assorted waste going into the river channel contributes to the turbidity of water and also leads to deterioration of its water quality.

Therefore, muck needs to be dumped in an environmentally sound manner at pre-identified dumping sites. Also, in order to avoid any deterioration in water quality a proper sewage disposal system to check the discharge of waste into the river is essential. In the absence of such measures there is bound to be deterioration in water quality and consequent changes in the aquatic biota.

Audit noticed that adequate measures for proper muck disposal had neither been taken by the IPPs nor ensured by the department as elaborated under **para 5.3.3.**

5.3.1 Inadequate downstream flow

In order to maintain and sustain aquatic ecosystem in the downstream stretch of a river, sufficient amount of discharge during the lean period has to be ensured. However, audit analysis revealed that the policy on hydro-power projects is silent on this vital issue. Further, there is an absence of clear directions from the UEPPCB in the matter of downstream flows.

While computing the power potential of a project, sacrificial discharge of 10 *per cent* is taken into account, which is to be left untapped for fulfilling the requirements of maintaining downstream flows. Audit noticed that, this provision for sacrificial discharge taken for calculating the power potential of a project cannot be taken as constituting any binding commitment on the project developer for ensuring a minimum flow to this extent during the lean season.

For mitigating the downstream impacts, Himachal Pradesh has notified[24] (September 2008) a minimum flow of 15 per cent of the lean season, to be maintained by hydro-electric projects. However, no such norm has been stipulated by Uttarakhand.

The physical verification (during May 2009 to July 2009) at the project sites of all the four operational projects[25], falling in the audit sample, showed that river-beds down stream had almost completely dried up and the water flow was down to a trickle and extremely inadequate for the sustenance of ecology and nearby groundwater aquifers.

i. During interaction with the local residents of village situated in the vicinity of the Debal Hydro Power Project, it was informed (June 2009) that natural water resources used for drinking and irrigation purposes have depleted considerably because of diversion of river waters in the power tunnel. Audit also noticed that the issue has been brought to the notice of both the project developers as well as the concerned Government Departments, but the problems have remained unaddressed.

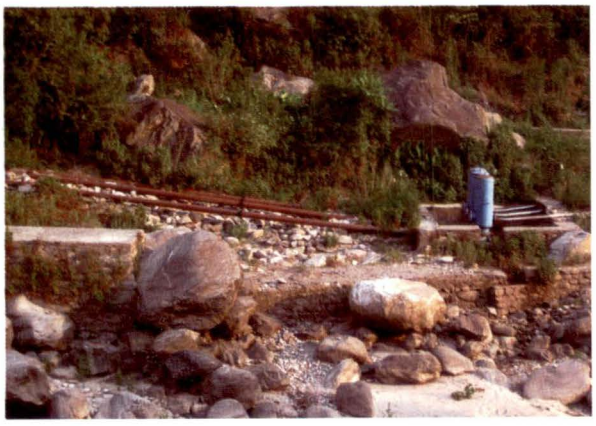
Debal - Downstream flow; Penstock is seen parallel

[23] The muck essentially comes from the road-building activity, tunneling and other excavation works.

[24] Applicable on upcoming hydro-power projects

[25] Rajwakti, Debal, Hanumanganga and Loharkhet

Rajwakti: Downstream flow of river Nandakini



Rajwakti: Defunct Hydram

ii. Due to diversion of the river course for the Rajwakti Hydro Project, 60 beneficiaries[26] were deprived of irrigation facilities as the hydram[27] constructed for the purpose became defunct. This was in contravention of the conditions of the IA, which clearly mentions that the IPP will be responsible for taking remedial measures to mitigate any adverse impact on existing facilities of irrigation or water supply.

iii. The residents of village Kail reported a threat to their lives due to the diversion of river Kail for the Debal hydro-power project. The natural water course which happened to be a safeguard from wild animals had dried up making the villagers and their livestock easy prey to wild animals from the nearby forest area.

iv. Due to trench type weir design of Loharkhet and Hanuman Ganga hydro-project the downstream flow got completely terminated during the lean season when the demand for water is at its peak as *discussed in Para 4.4.*

The State Government accepted the fact that at present there is no policy regarding maintaining of sacrificial discharge because the MoEF and CWC are yet to arrive at any decision regarding the same. However, any directions from these agencies for maintaining adequate down stream flow would be welcome and incorporated by designing appropriate policy.

5.3.2 Cumulative devastating effect

In an audit exercise undertaken to measure the impact of curtailed downstream flows, the diversion reach for all the 13 sampled run-of-river projects was calculated[28] based on the DPRs of respective projects. It is shown in the table 8.

Audit observed that, on an average 4.16 km of diversion reach is associated with one run-of-river project which appears to constitute an acceptable environmental impact. However, when combined with the diversion reach of other power projects on the same river the results could become environmentally unacceptable.

[26] From the villages of Tefina and Gwalla.

[27] Lift irrigation

[28] Diversion reach has been calculated by summing up the lengths of intake, desilting tank, penstock and tailrace; this would result in a conservative estimation of the diversion reach as the actual downstream river flow might cover a longer area.

Table : 8

SL. NO.	NAME OF PROJECT	DIVERSION REACH (IN KM)
1.	Rajwakti	2.56
2.	Debal	3.79
3.	Loharkhet	2.67
4.	Agunda Thati	2.11
5.	Birahiganga	1.67
6.	Kakora Gad	2.62
7.	Hanuman Ganga	1.86
8.	Melkhet	13.79
9.	Bhyunder Ganga	4.42
10.	Srinagar (GVK)	4.72
11.	Birahi Ganga-II	3.29
12.	Bhilangana III	4.77
13.	Alaknanda (GMR)	5.80

Source : Information extracted from DPRs

Table : 9

RIVER (INCLUDING TRIBUTARIES)	STATUS	HYDROPOWER PROJECTS		CUMULATIVE DIVERSION REACH (IN KM)
		NUMBER OF PROJECTS	COLLECTIVE CAPACITY (IN MW)	
Alaknanda	Operational	04	406.20	16.64
	Under construction	06	1643.00	24.96
	Planned	50	2843.63	208.00
	Total	**60**	**4892.83**	**249.60**
Bhagirathi	Operational	03	2394.00	12.48
	Under construction	08	1727.00	33.28
	Planned	16	494.75	66.56
	Total	**27**	**4615.75**	**112.32**
Yamuna	Operational	03	114.75	12.48
	Under construction	01	120.00	4.16
	Planned	18	1210.21	74.88
	Total	**22**	**1444.96**	**91.52**
Dhauliganga	Operational	01	280.00	4.16
	Under construction	00	--	--
	Planned	08	1282.00	33.28
	Total	**09**	**1562.00**	**37.44**
Mahakali	Operational	01	120.00	4.16
	Under construction	00	--	--
	Planned	11	1482.75	45.76
	Total	**12**	**1602.75**	**49.92**

Source : Information extracted from the records of UJVNL.

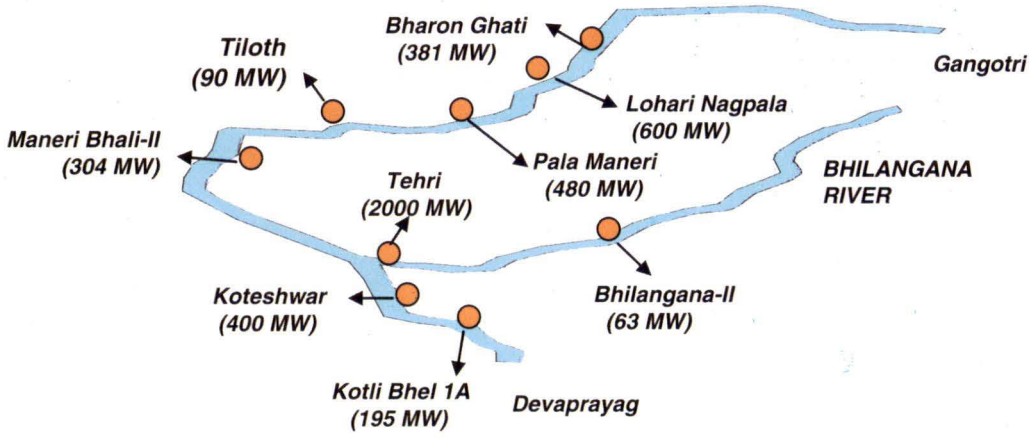
The cumulative diversion reaches for hydro-power projects being built/ planned on a particular river are tabulated in table 9, based on audit analysis, taking an average of 4.16 km per ROR project.

In audit; the case of Alaknanda river valley was analysed and is highlighted to provide an insight on the dimension of the problem arising out of the growing diversion reaches of such projects.

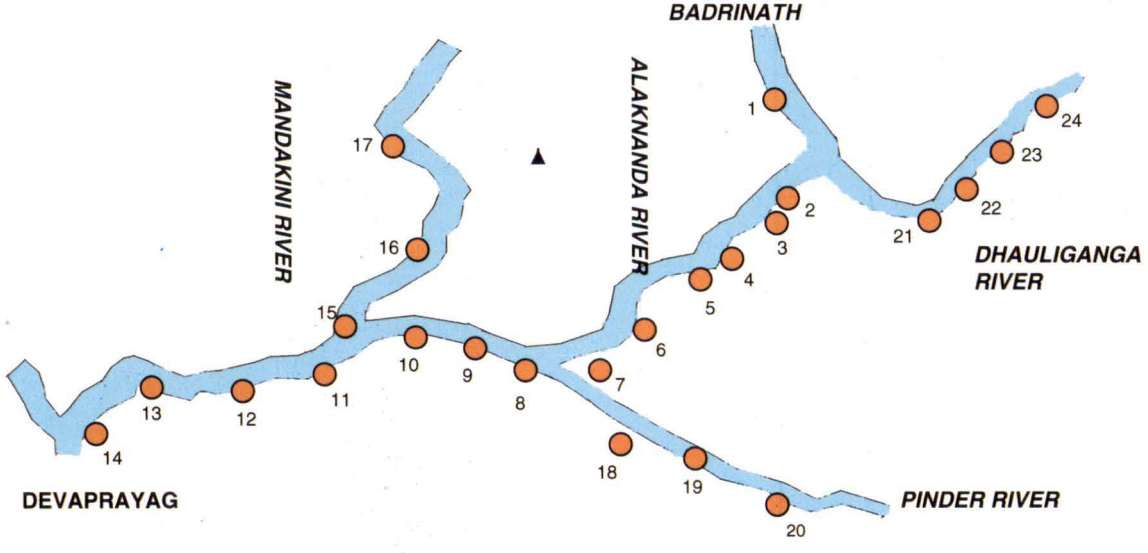
60 hydro projects, entailing a cumulative diversion reach of nearly 249.60 km, have either been built or are in the pipeline. If appropriate measures to ensure adequate downstream flow are not taken, it may cause a devastating effect on the region falling under the river valley.

The hydro-power projects, with capacity of above 25 MW planned in Bhagirathi & Alaknanda river valleys (*Appendix 1 & 2*) have been illustrated in the maps below:

Hydro-power projects (above 25 MW) planned in Bhagirathi river valley



Hydro-power projects (above 25 MW) planned in Alaknanda river valley



Alaknanda (300 MW)	Utyasu-IV (125 MW)	Rambara (76 MW)
Vishnuprayag (400 MW)	Utyasu-III (195 MW)	Bangasi (44 MW)
Tapovan Vishnugad (520 MW)	Utyasu-II (205 MW)	Ming Nalgaon (114 MW)
Vishnugad Pipalkoti (444 MW)	Utyasu-I (70 MW)	Devsari Dam (300 MW)
Bowala Nandprayag (300 MW)	Srinagar (330 MW)	Lata Tapovan (171 MW)
Nandprayag Langasu (141 MW)	Kotli Bhel IB (320 MW)	Tamaklata (280 MW)
Utyasu-VI (70 MW)	Singoli Bhatwari (99 MW)	Jelam Tamak (60 MW)
Utyasu-V (80 MW)	Phatabyung (76 MW)	Maleri Jelam (55 MW)

Given the current policy for vigorously pursuing hydro-power projects, the potential cumulative effect of multiple run-of-river power projects can become very significant. Presently, approximately 42 hydro-power projects are in operation and 203 more are under construction or in the clearance stage while several others are at the conceptual stage.

On being pointed out, the State Government was of the view that the quantum of water required for sustenance of aquatic life, flora and fauna is yet to be established.

5.3.3 Muck Disposal

The directions of the MoEF, GoI relating to muck disposal state that muck generated from excavation in course of construction activity, must be disposed in a planned manner so that it takes the least space, is not hazardous to the environment and does not contaminate any land or water source. With special reference to hilly areas, muck-disposal should be carried in such a way that usable terraces are developed with suitable retaining walls. The terraces should ultimately be covered with fertile soil and suitable plants.

i. The IA for hydro power projects also stipulates that suitable sites be identified for muck disposal. However, during physical inspection, Audit noticed that the Srinagar hydro-power project being built by GVK on river Alaknanda did not follow the GoI directions on muck disposal. In blatant violation of these directions, the muck was being dumped near the river banks. This led to increase in the turbidity of river water and shrinkage of the river catchment area. Stern resentment was noticed among the local residents of the affected areas.

Srinagar project on river Alaknanda - Muck disposal

ii. In Debal, the Chamoli Hydro Power Project which is in operation did not follow the norms of MoEF, GoI, regarding proper development of the Muck Disposal Site. The site should have been developed by making terraces and then covered with fertile soil and suitable plantation which was not done.

iii. In Rajwakti, the project authorities of Him Urja Hydro-power project could not show the disposal site, leaving the possibility of muck being dumped in the river Nandakini itself.

iv. The project authorities of Agunda Thati Hydro Power Project also, did not take steps for proper muck disposal. Even the protection wall of the power channel which would have stopped the muck from being dumped into river Balganga had not come up.

The above instances illustrate that negligence of environmental concerns was obvious as the muck generated from excavation and construction activities was being openly dumped into the rivers contributing to increase in the turbidity of water. The projects seemed oblivious of the fact that such gross negligence of environmental concerns lead to deterioration of water quality and adverse impact on the aquatic biota.

On being pointed out the State Government stated that defaulters have been issued warning and have been directed to meet the desired standards/ requirements.

However, the fact remains that the basic aim of muck management to protect the areas from soil erosion, encourage afforestation, ensure proper utilization of muck and the development of the areas in harmony with the landscape of the project area remained unfulfilled.

5.3.4 Establishment of Stone Crushers

During field inspection, it was found that stone crushers had been established within the project premises of two projects, namely Bhilangana-III and Srinagar. The conditions associated with the permission obtained from UEPPCB were thus not being followed by the project developers.

The establishment of the crushers was also a clear violation of the norms fixed by the State Mining Policy, wherein it has been prescribed that crushers should be installed at a minimum distance of 500 m from the river. However, no action was reported to have been taken either by the Board or by UJVNL in this matter.

Bhilangana-III : Stone crusher

Srinagar hydro project: Stone crusher

5.4 Impact on Terrestrial Ecosystems

Though run-of-river projects do not involve submergence of vast areas of land and vegetation yet, construction of project facilities, access roads to the project site, and transmission systems and lines would involve deforestation. There are thus risks of soil erosion, disruption to local flora and fauna and disturbance to hill slopes. However, these can be mitigated through afforestation.

5.4.1 Negligible afforestation

Afforestation is considered necessary

- To avoid soil erosion
- For rehabilitation of degraded forest areas

- For countering the effects of quarrying
- For habitat improvement and
- For structural stabilisation in landslide prone areas

The status of tree-plantation in the case of the four operational projects and four projects under construction which were part of the audit sample is tabulated in table 10.

Audit noticed that out of the eight projects, three reported zero achievement with regard to afforestation, while in one project the plantation rate was approximately half of the requirement. In the remaining four projects, afforestation requirements had been fully met. However, data pertaining to survival ratio was not made available by the concerned forest divisions.

Thus, the plantation activity was highly deficient, as 38 *per cent* of projects reported hardly any plantation; posing severe hazards both for natural ecology and stabilization of hill slopes.

On being pointed out, the State Department assured that the provisions regarding afforestation exist in the Catchment Area Treatment Plans of the Mega Projects and would be executed once the project become operational.

5.5 Geo-physical Impacts

The entire State of Uttarakhand is categorized as falling in Zone IV and V of the Earthquake Risk Map of India, as depicted in the diagram. The region has witnessed devastating earthquakes in 1720 (Kumaun Earthquake) and 1803 (Garhwal Earthquake). In the recent past earthquakes in Uttarkashi (1991) and Chamoli (1999) have been witnessed. Despite the threat of earthquakes looming large, hydro-power projects are in vogue in the State.

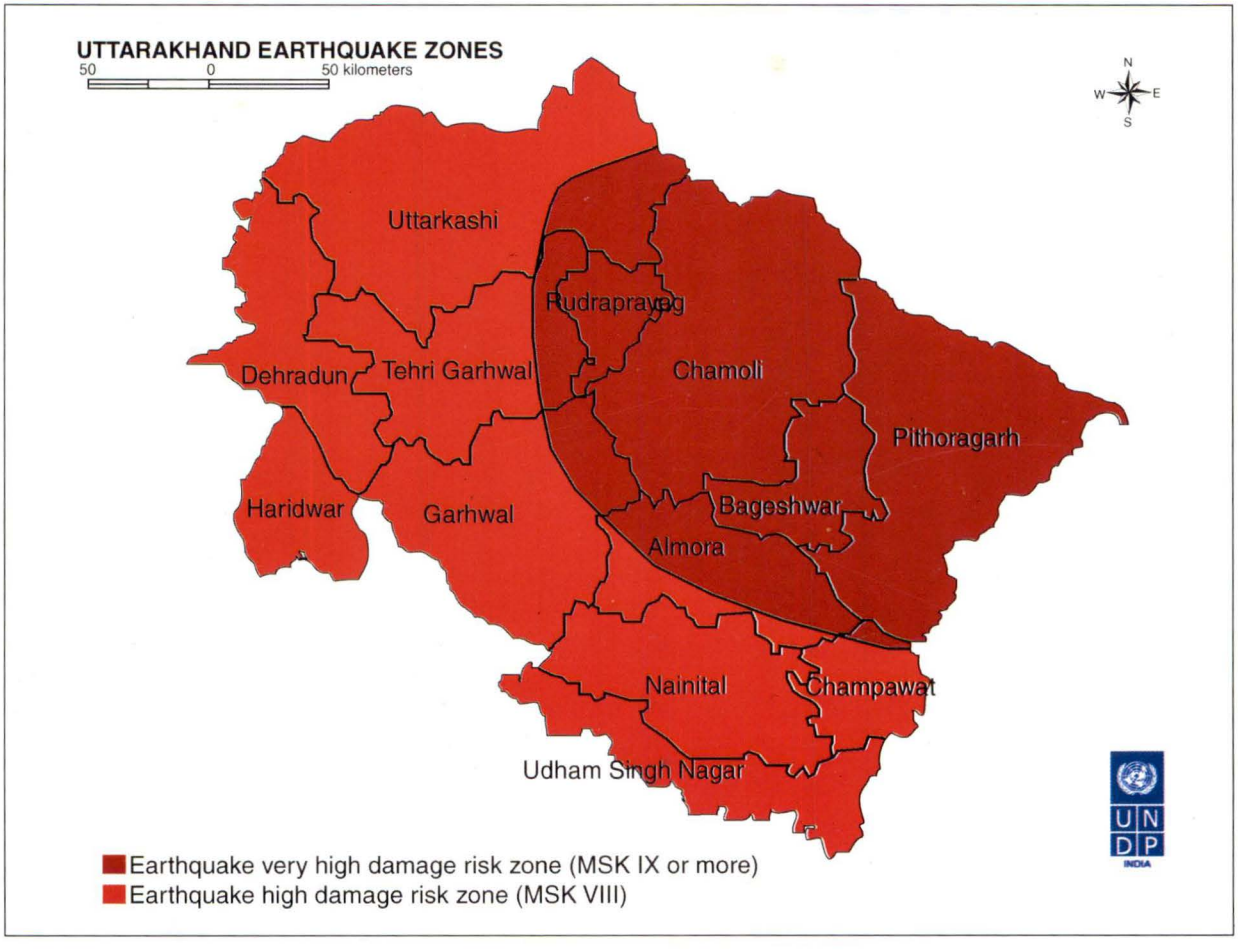
Audit analysis revealed that, negligence in applying appropriate construction norms and structuring the project without appropriate technical counter measures may expose projects to enhanced seismic vulnerability. Therefore, it is essential that earthquake safety measures are incorporated by adopting suitable seismic coefficient in the design for various structures forming part of the project.

While the mountains provide large amounts of water run-off for run-of-river projects from melting snow and glacier ice, glacier lakes can pose a significant hazard. Bursting of glacial lakes cause flashfloods with catastrophic consequences.

Table : 10

STAGE	NAME OF THE PROJECT	FOREST AREA (IN HECTARES)	NO. OF TREES CUT DOWN FOR SITE CLEARANCE	NO. OF TREES TO BE PLANTED	NO. OF TREES PLANTED
Operational	Rajwakti	3.834	Nil	15400	8470
	Debal	2.860	08	10400	Nil
	Hanuman Ganga	2.098	04	--	16000
	Loharkhet	2.876	53	11504	Nil
Under construction	Srinagar	NA	1739	115720	Nil
	Agunda Thati	2.332	117	9200	9200
	Birahi Ganga	4.658	98	28000	28000
	Bhilangana-III	8.330	47	19500	19500

Source: Information obtained from DFOs & project developers.



5.6 Safety measures

A scrutiny of the DPRs of the projects included in the audit sample revealed that geo-physical aspects were given due consideration while planning the projects. The details for the sampled projects are tabulated in table 11.

As is apparent from the above, safety measures adopted by the project developers vary greatly despite the projects being situated in the same seismic zone. Further, in the absence of adequate checks by either the Urja Cell or UJVNL, the implementation of the above mentioned measures can not be guaranteed.

5.7 Flash floods

Flash floods may occur due to cloud bursts, incessant heavy rains and bursting of glacial lakes. The adverse consequences of such floods are acute as they can not only damage the project structures but can cause loss of live in low-lying down stream areas. Civil construction in projects is required to factor in this natural threat. Also the bigger the project, the greater should be the efficacy of the preventive measures.

Audit scrutiny of project records revealed that no specific measures had been planned/ designed in any project to cope with the risk of flash floods. Information collected from project developers revealed that flash floods have occurred in the past as depicted in the table 12.

It is pertinent to mention here that the three projects mentioned above are of low capacity and thus do not carry as much risk for the local

Table : 11

STAGE	NAME OF THE PROJECT	SEISMICITY	MEASURES SUGGESTED IN DPRS
Operational	Rajwakti	Zone-V	Suitable plantation on slopes
	Debal	Zone-V	Incorporation of seismic factor during installation of project components
	Hanuman Ganga	Zone-IV	No specific measures
	Loharkhet	Zone-V	Removal of loose boulders, construction of retaining walls up-slope and down-slope, incorporation of seismic factor while designing engineering structures
Under construction	Srinagar (GVK)	Zone-IV	Copy of DPR not provided
	Agunda Thati	Zone-IV	Project has been located on stable geological strata; alignment of power channel and penstock has been planned in such a manner so as to avoid slip zone.
	Birahi Ganga	Zone-V	Intake structure, approach channel and tunnel have been constructed on stable rocks.
	Bhilangana-III	Zone-IV	Careful planning in setting up of project components
DPR approval stage	Bhyunder Ganga	Zone-V	Due investigation has been carried in the critical reaches to ensure long term stability
	Alaknanda (GMR)	Zone-V	Designing of tunnel section and other components is such to provide increased strength in zones of weakness
DPR preparation stage	Melkhet	Zone-V	--
	Kakoragad	Zone-IV	--
	Birahi Ganga - II	Zone-V	--

Source : Information extracted from DPRs of concerned projects.

Table: 12

NAME OF THE PROJECT	PERIOD	DISRUPTION
Rajwakti	September 2002	Damage to power channel; stoppage of power generation for 28 days
Hanuman Ganga	July 2005	Extensive damage to power house leading to temporary closure of project for four months involving energy loss worth Rs. 1.29 crore
Loharkhet	August 2008	Stoppage of power generation for 15 days

Source: Information provided by IPPs.

community. The consequences can be far worse had projects of high capacity been involved. In fact recently an incident where the coffer dam of the 330 MW Srinagar hydro-power project, had burst due to a flood like situation following incessant rains. This created considerable alarm in the downstream areas.

In conclusion, the above also shows inadequate construction practices being followed by project developers who failed to cater for such eventualities which are common place in the region. Additionally, it also highlights the ineffective monitoring by the GoU and the nodal agency as a result of which the slapdash approach of the project authorities towards project execution has gone on unchecked.

Recommendations

- The individual and cumulative impact on the downstream river flow should be seriously considered to ensure that the projects do not result in disastrous impact on the environment.
- The head pond, weir and intake associated with the diversion ought to be designed to minimize impacts, including those affecting aquatic life, sediment movement and flooding.
- Minimum flow in the diversion reach should be computed and prescribed taking into account the groundwater recharge potential of the river, irrigation, ecology and silt load factor.
- There is an urgent need for UEPPCB to strengthen its monitoring mechanism to ensure appropriate and timely action against projects that violate and are negligent of environmental concerns.
- In accordance with the GoI guidelines, an additional 1 *per cent* free power from the project may be provided and earmarked for Local Area Development Fund.

Chapter 6

GOVERNMENT SUPPORT

Chapter 6

[Government support]

In the absence of a well-laid down policy, land acquisition proved to be a major obstacle, derailing project development from its time schedule. Forest land clearances were received with delays ranging from 85 days to 295 days in many cases.

In a certain case, grid infrastructure for power evacuation was not installed well in time resulting in energy losses and deferment of royalty payments to the Government.

6.1 Land Acquisition

The National Policy for hydro-power development stressed on the need to insulate the project developers from problems arising out of land acquisition and resettlement and rehabilitation (R&R) issues. It clearly specified that the responsibility of the concerned State Government with regard to land acquisition covering all kinds of land i.e government, private and forest, for the projects would be in terms of the provisions made in the power policy of the concerned State.

However, audit analysis revealed that the policies promulgated by the GoU for all the three categories of hydro power projects, were found to be silent on the issue of land-acquisition; as is evidenced from the findings discussed below:

6.1.1 Private land

For projects with a capacity of more than 100 MW, the policy stated that the State Government will provide necessary assistance to the project developer with regard to rehabilitation of persons and families affected by the project. The policy document contained a reference to the R&R policy of the State. However, audit noticed that no such policy has been laid down by the GoU as yet. As intimated by UJVNL, R&R policy for hydro power projects in Uttarakhand has been framed, but is awaiting approval.

As a result acquisition efforts were beset by delays as varied demands of the affected people viz. for employment in lieu of land and land at places of choice in lieu of acquired land could not be resolved. This converted into undue delays for many projects. Like Audit noticed that the project at river Alaknanda, being developed by GMR involved acquisition of 5.415 hectares of private land affecting 134 families. The developer failed twice in negotiating terms and conditions for acquiring land and the matter remained unresolved as of August 2009.

6.1.2 Forest land

The policy document for projects below 100 MW made UJVNL responsible for providing assistance to project developers in obtaining the necessary clearances for forest land in a time-bound manner.

As per the Forest (Conservation) Act, 1980 every user agency who wants to use any forest land for non-forestry purposes, shall seek prior approval for transfer of forest land from Ministry of Environment and Forest (MoEF), GoI. In terms of the procedure laid down, the process of obtaining clearance for transfer of forest land should be completed within a period of 150 days from the date of submission of the proposal for requirement of forest land to the concerned DFO. Ninety days have been given

for finalization of the proposal at the State level and 60 days for obtaining final clearance from MoEF, GoI.

Scrutiny of records revealed delays ranging from 85 days to 295 days in getting forest clearances as detailed in the table 13.

The delays were mainly attributed to the time taken by the project developer in providing vital information for filling up the proposals. Time is also taken in obtaining follow-up reports from the project developers on the conditions laid down by the MoEF, GoI while granting 'in principle' approvals. It is only on receipt of follow-up reports that final approval for transfer of forest land is granted by the MoEF, GoI. Thus, such delays not only resulted in derailing project development from its time schedule but also deprived the State supply of electricity.

On being pointed out the State Government assured that as far as the delays at State level are concerned, it will be looked into and streamlined. The delays at GoI level will be taken up with the concerned Ministry at the appropriate level.

6.2 Power Evacuation facility

In terms of the policy for hydro-power projects, the Government is mandated to provide power evacuation facilities through the Uttarakhand Power Corporation Limited/Power Transmission Corporation of Uttarakhand Limited (UPCL/ PTCUL) grid beyond the inter-connection point between the grid and the project's transmission line. Even the Central Electricity Act advocates a well planned transmission system for optimal utilization of generating facilities and for secure and reliable grid operation.

There are many constraints - forest, environmental, rehabilitation and availability of space in establishing power evacuation facilities that need to be dealt with effectively. An integrated approach in this regard is essentially required so that creation of evacuation facilities is synchronized with commissioning of power plants. The following case is an example of the consequences of not doing so.

Audit scrutiny revealed that the Hanuman-Ganga project was completed in September 2003, but UPCL provided facility for evacuation of power only in March 2005. This delay caused

Table : 13

NAME OF THE PROJECT	DATE OF RECEIPT OF PROPOSAL	DATE OF SUBMISSION TO MOEF BY NODAL OFFICE	DELAY (DAYS)	DATE OF FINAL APPROVAL	DELAY (DAYS)	COMBINED DELAY (DAYS)
Debal	18.5.2004	12.8.2004	--	15.3.2005	156	156
Agunda Thati	1.1.2004	9.3.2004	--	26.2.2005	295	295
Birahi Ganga	24.12.2004	16.6.2005	85	26.9.2005	43	128
Bhyunder Ganga	9.5.2008	6.12.2008	122	19.1.2009	--	122
Bhilangana-III	18.9.2006	22.11.06	--	15.4.2007	85	85

Source : Information extracted from the records of CCF & DFOs.

an energy loss worth Rs. 6.22 crore[29] and deferment of royalty payments by 18 months, besides depriving the State from the benefits from the project.

Thus, non-installation of grid infrastructure for power evacuation, in time, resulted in energy losses and deferment of royalty payments to the Government.

On being pointed out (November 2009) the State Government accepted that due to this, UPCL had to compensate Rs. 6.80 crore to Hanuman Ganga Power Project.

Recommendations

- *The State Government may urgently constitute a nodal authority for addressing the problems of land acquisition, forest clearance and resettlement & rehabilitation for all the projects.*
- *It is an essential requirement that reliable grid infrastructure should be made available well before the expected synchronization of the hydropower projects to avoid energy losses in absence of evacuation facilities.*

(PRAVIR PANDEY)
Accountant General (Audit), Uttarakhand

Dehradun
The 11 मार्च MAR 2010

Countersigned

(VINOD RAI)
Comptroller and Auditor General of India

New Delhi
The 12 मार्च MAR 2010

[29] Average monthly generation of year 2006-07: 13,83,575 kwh * 18 * Rs. 2.50 = Rs. 6.22 crore.

APPENDICES

Appendix 1

[Reference paragraph: 5.3.2]

Statement of projects planned in the Bhagirathi River and its main tributary i.e. Bhilangana

S. NO	NAME OF THE RIVER/ MAIN TRIBUTARY	NAME OF PROJECTS	ESTIMATED POTENTIAL (MW)	PRESENT STATUS
1.	Bhagirathi	Maneri Bhali Stage-II	304.00	Project under operation
2.	Bhagirathi	Tiloth	90.00	Project under operation
3.	Bhagirathi	Pala Maneri	480.00	Project under construction
4.	Bhagirathi	Bharon Ghati	381.00	Project under development
5.	Bhagirathi	Suwarigad	2.00	Project under construction
6.	Bhagirathi	Limchagad	3.50	Project under construction
7.	Bhagirathi	Tehri Dam	1000.00	Project under operation
			1000.00	Project under construction
8.	Bhagirathi	Koteshwar Dam	400.00	Project under construction
9.	Bhagirathi	Kotli Bhel- IA	195.00	Project under construction
10.	Bhagirathi	Loharinagpala	600.00	Project under construction
11.	Bhagirathi	Siyangad	4.90	Project under development
12.	Bhagirathi	Jalandharigad	24.00	Project under development
13.	Bhagirathi	Kakora Gad	5.00	Project under development
14.	Bhilangana	Jakhana	0.10	Project being developed
15.	Bhagirathi	Gangotri-I	0.10	Project being developed
16.	Bhilangana	Gangi-Richa	0.20	Project being developed
17.	Bhagirathi	Pinsward	0.05	Project being developed
18.	Bhagirathi	Kathi Jhala	0.20	Project being developed
19.	Bhagirathi	Balganga-II	7.00	Project being developed
20.	Bhagirathi	Ratal Dhara	0.40	Project being developed
21.	Bhagirathi	Dhatirmauli	0.40	Project being developed
22.	Bhagirathi	Lambgaon	0.40	Project being developed
23.	Bhagirathi	Jalkur Gad-I	2.00	Project being developed
24.	Bhilangana	Bhilangana-II	63.00	Project under development
25.	Bhilangana	Bhilangana	22.50	Project under construction
26.	Bhilangana	Bhilangana-III	24.00	Project under construction
27.	Bhilangana	Kot-Buda Kedar	6.00	Project under development
Total :			**4615.75**	

Project under operation=3, Project under construction=8, Project under development=6, Project being developed=10

Appendix 2

[Reference paragraph: 5.3.2]

Statement of projects planned in the Alaknanda river and its main tributaries i.e. Dhauliganga, Pinder & Mandakini

S. NO.	NAME OF THE RIVER/TRIBUTARY	NAME OF PROJECTS	ESTIMATED POTENTIAL (MW)	PRESENT STATUS
1.	Dhauliganga	Tamaklata	280.00	Project under development
2.	Alaknanda	Nand Prayag Langasu	100.00	Project under development
3.	Alaknanda	Bowla Nand prayag	300.00	Project under development
4.	Alaknanda	Tapowan	0.80	Project under operation
5.	Alaknanda	Vishnugad Pipalkoti	444.00	Project under construction
6.	Alaknanda	Kotli Bhel-IB	320.00	Project under construction
7.	Dhauliganga	Tapovan Vishnugad	520.00	Project under construction
8.	Dhauliganga	Lata Tapowan	125.00	Project under development
9.	Pinder	Devasari Dam	300.00	Project under development
10.	Dhauliganga	Maleri Jhelam	55.00	Project under development
11.	Dhauliganga	Jhelam Tamak	60.00	Project under development
12.	Alaknanda	Vishnuprayag	400.00	Project under operation
13.	Alaknanda	Srinagar (GVK)	330.00	Project under construction
14.	Alaknanda	Alaknanda (GMR)	300.00	Project under development
15.	Alaknanda	Sarma	0.10	Project being developed
16.	Pinder	Bor Balade	0.03	Project being developed
17.	Pinder	Wachhamm	0.50	Project being developed
18.	Pinder	Ghes	0.10	Project being developed
19.	Pinder	Bank	0.10	Project being developed
20.	Pinder	Choting	0.10	Project being developed
21.	Alaknanda	Wan	0.05	Project being developed
22.	Alaknanda	Gaunichaira	0.25	Project being developed
23.	Dhauliganga	Gansali Bampa	0.05	Project being developed
24.	Alaknanda	Nigal Gad	0.50	Project being developed
25.	Alaknanda	Hapla Gad	0.50	Project being developed
26.	Alaknanda	Garud Ganga	0.60	Project being developed
27.	Alaknanda	Utyasu-VI	70.00	Project being developed
28.	Alaknanda	Utyasu-V	80.00	Project being developed
29.	Alaknanda	Utyasu-IV	125.00	Project being developed
30.	Alaknanda	Utyasu-III	195.00	Project being developed
31.	Alaknanda	Utyasu-II	205.00	Project being developed
32.	Alaknanda	Utyasu-I	70.00	Project being developed

33.	Dhauliganga	Ringi	5.50	Project being developed
34.	Dhauliganga	Subhain	8.00	Project being developed
35.	Dhauliganga	Gaddi	5.25	Project being developed
36.	Dhauliganga	Kosa	24.00	Project being developed
37.	Dhauliganga	Hom	6.00	Project being developed
38.	Dhauliganga	Duna Giri	10.00	Project being developed
39.	Alaknanda	Kalpganga	6.25	Project being developed
40.	Alaknanda	Amritganga	6.00	Project being developed
41.	Alaknanda	Balkhila-I	5.50	Project being developed
42.	Mandakini	Chunni semi	24.00	Project being developed
43.	Mandakini	Son	7.00	Project being developed
44.	Mandakini	Mandaniganga	10.00	Project being developed
45.	Mandakini	Madmaheshwar-II	6.00	Project being developed
46.	Mandakini	Lustar	6.00	Project being developed
47.	Pinder	Ming-Nalgaon	114.00	Project being developed
48.	Pinder	Bangri	44.00	Project being developed
49.	Pinder	Buara	14.00	Project being developed
50.	Alaknanda	Byali	2.25	Project being developed
51.	Alaknanda	Santodhar-I	2.00	Project being developed
52.	Alaknanda	Santodhar-II	2.00	Project being developed
53.	Alaknanda	Nayar	17.00	Project being developed
54.	Pinder	Tharali	0.40	Project under operation
55.	Pinder	Debal	5.00	Project under operation
56.	Pinder	Melkhet	24.00	Project under construction
57.	Pinder	Kailganga	5.00	Project under construction
58.	Mandakini	Singoli Bhatwari	99.00	Project under development
59.	Mandakini	Ramabara	76.00	Project under development
60.	Mandakini	Phata Byung	76.00	Project under development
Total :			**4892.83**	

Project under operation=4, Project under construction=6, Project under development=11, Project being developed=39

PRICE : Rs. 65.00 (Inland)
US $ 5 (Overseas)

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Designed & Printed at Shiva Offset Press, Dehradun Ph. 0135-2715748